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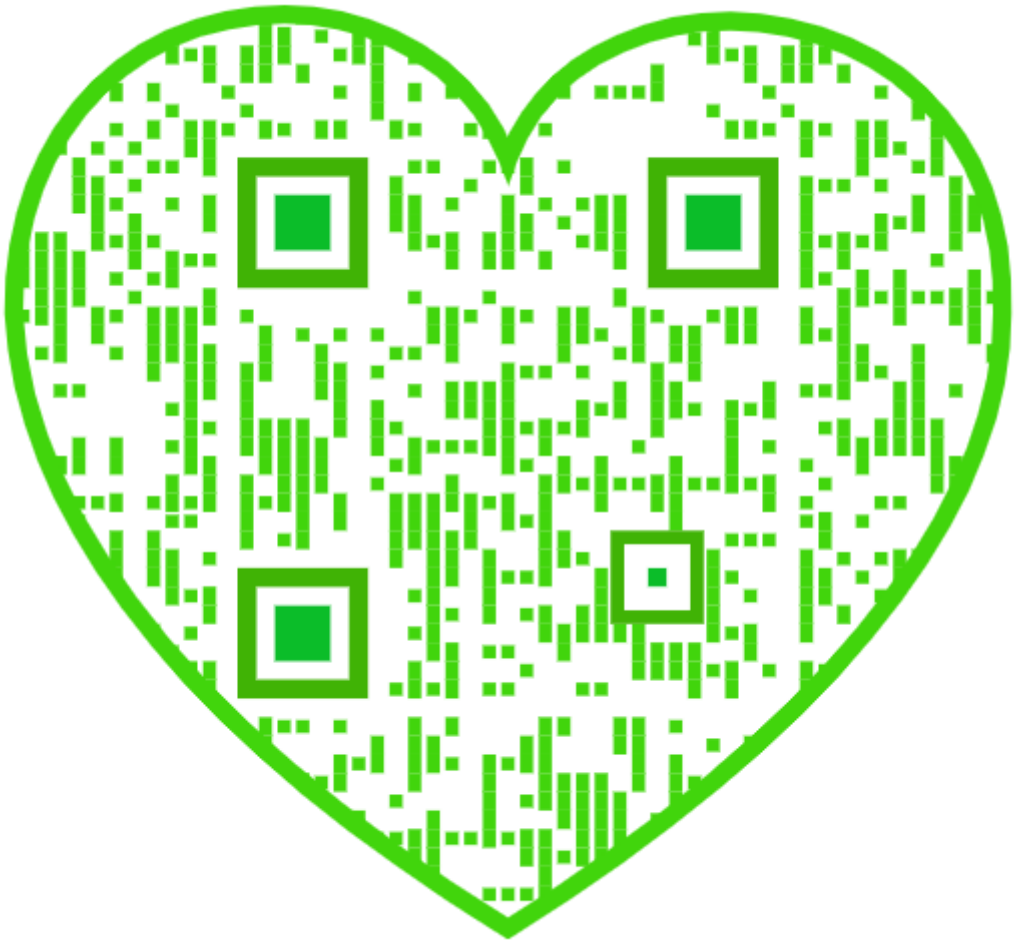

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ERRATA.

Page 3, column 2, line 22, for *heat* read *hint*.
" 8, " 1, " 52, insert *from* after *to*.
" 20, " 2, " 19, for *bonewale* read *bonewell*.
" 28, " 2, " 17, 26, 29, for *physical* read *psychical*
" 37, " 1, " 52, for *four* read *three*.
" 37, " 2, " 18, for *provided* read *produced*.
" 43, " 1, " 41, for *members* read *numbers*.
" 57, " 1, " 34, for *comb* read *frame*.
" 75, " 2, " 31, for *experimental* read *artificial*.
" 77, " 1, " 6, for *wherein* read *wherever*.
" 91, " 1, " 2, for *those* read *three*.
Page 168, column 2, line 11, after *has* insert *been*.
" 172, " 1, " 15, for *fully* read *freely*.
" 194, " 1, " 6, for *Hyssus* read *Ilyssus*,
" 227, " 1, " 19, for *it with* read *with it*.
" 229, " 1, " 28, for *cousine* read *cuisine*.
" 232, " 1, " 8, for *spectator* read *operator*.
" 248, " 2, " 6, insert *the* after *of*.
" 248, " 2, " 6, for *wing* read *ring*.
" 249, " 1, " 3, strike out *the*
" 249, " 1, " 3, for *same* read *some*.

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VOL. I. JANUARY, 1861. No. 1.

Bee Culture.

BEE CULTURE need no longer be a precarious and empirical pursuit. Discoveries and improvements comparatively recent, have so elucidated its principles, that its processes can be more definitely regulated than those of almost any other branch of rural economy. Without being divested in the least of that attractiveness which, from the earliest periods of history, drew to it the attention alike of the humble cottager and the inquiring student—making it a subject of unflagging interest and unfailing enjoyment, it now claims additional regard from the fact that it can be so conducted as to become a source of certain and amply remunerating profit. It may be viewed, first, as a *science* having for its object the attainment of a correct knowledge of all that pertains to the life, habits and instincts of the honey bee; and, secondly, as *a practical art*, which regards all the attainments thus made and to be made, as the only reliable foundation of successful management.

The chief cause of the depressed condition of bee culture in general, is not to be traced to any want of attention to the subject. It is to be found rather in an inadequate knowledge of and erroneous opinions concerning the physiology and habits of the insect; in the defective or ill-adapted construction of the hives, however differing in form and material, in which it has been doomed to live and labor; and in an injudicious mode of treatment. This, more than aught else, has prevented bee culture from making progress commensurate with the time and attention devoted to it. Despite the most assiduous observation and study, the interior of the hive and the domestic economy of the colony, remained till recently, and still remain for the masses, *a mystery*. The common beekeeper knew that he was the owner of a stock of bees; he knew also, if he knew much, that among them was a queen, and workers, and drones. But the peculiar functions of each kind or class, and their respective relations to each other were, and still are with most persons, matters of conjecture and dispute. Of the means, also, of properly directing the labors of a colony, of regulating its operations systematically, so as to secure desired ends, almost utter ignorance prevailed, and still prevails very generally. After the swarm was secured—whether with or without superstitious observances—the hive was placed on its stand, and the bees were allowed to prosecute their labors as best they might. If in peculiarly favorable seasons or locations, the stock happened to thrive satisfactorily, its owner was thought to have *luck;* but rarely had any one the vanity to claim success as the result of his management. And yet, duly allowing for the vicissitudes of seasons, certain and regular success does most essentially depend on *management*. An adequate knowledge of the nature, habits, and instincts of the insect having once been attained, and a thorough control of the operations of the colony secured by the use of properly-constructed hives, the business fairly and truly becomes a subject of mere management. The means of acquiring such knowledge have now been made accessible, and hence we were warranted in stating, as we did, that bee culture need no longer be a precarious pursuit, but should be one regulated by system. The accumulated discoveries made within the last fifteen years, combined with deductions from facts previously recorded, have totally revolutionized the business, placed it on a firm foundation, and given it an impetus which must cause it to advance and flourish. Having reached this stage of development, it claims a higher appreciation, and deserves

a more general diffusion than before. It can be successfully prosecuted to a large extent in almost every region of the temperate zone, and under almost any circumstances. It requires only a small amount of capital, and comparatively little room, and exacts so little time, that the ordinary intervals of leisure suffice. It may, indeed, be regarded as an agreeable relaxation from the severer toils of husbandry, the drudgery of mechanical occupation, or the worrying exactions of professional duty. It may furnish fit employment for the aged and the invalid.

But, in order to revive the business, to render it compensating, and to cause it to advance with steady pace, the establishment of a periodical paper, devoted to its interests, is highly important. In a country so extensive as this, where general Apiarian Conventions have not yet become customary, and beekeepers can seldom have personal intercourse with each other, a medium of communication, affording facilities for discussion and frequent interchange of opinions, is evidently needed. Such a medium, for those engaged in congenial pursuits, the "AMERICAN BEE JOURNAL" is intended to be; and such, with the aid and support of those for whose benefit it is specially intended, it may speedily become. It will serve, likewise, as a repository of whatever is, directly or collaterally, of practical value in this department of rural economy; and as a vehicle by which information can be readily, rapidly, and widely diffused, so that the early introduction of useful improvements may be secured. Such a periodical, will tend also to increase the number of apiarians, and thus make bee culture a business of more general importance, demonstrating, finally, that a vast and seemingly inexhaustible source of national wealth has hitherto been greatly neglected.

It is not proposed to give the Bee Journal a predominantly scientific cast. Aware that to be extensively useful, it must adapt itself to the wants of the community, it will constantly regard that object. Its contents must be diversified. Its columns must be accessible alike to the apiarian, whose experience and observations enable him to communicate information, and to the inquirer whose primary desire is to obtain instruction. But while aiming to render bee culture more popular, and foster its extension, the Bee Journal will endeavor to attract to it the attention of professed students of natural science, and such may be assured that it is a subject worthy of their powers. That which engaged the faculties of a Columella, an Aristotle and a Celsus, among the ancients, and of a Swammerdam, a Reaumur and a Huber, among the moderns, cannot certainly be devoid of attraction for an inquiring mind. It possesses fascination enough to engender even enthusiasm in its votaries, and much as has latterly been accomplished in the elucidation of obscure points, there remain mysteries enough to be explored and explained, to employ the most astute intellect. It is surprising, indeed, that the physiology and natural history of the honey bee have been made the subject of original investigation in so limited a degree by American naturalists. What has been done in that direction in this country, was done almost exclusively by men who commenced simply as apiarians; and nearly all that is to be found in treatises purely scientific, is a mere rehash from foreign publications substantially antiquated. This fact is not creditable to American genius; and now that a Leuckart, a Von Siebold, and a Dönhoff, in Germany, have set the example of renewed personal investigation, it is to be hoped that this inviting field will no longer be left unexplored by congenial minds here.

From the days of Aristotle to those of Swammerdam, (a period of nearly two thousand years,) little progress was made. The advance from the time of the latter to that of Huber was small, and thenceforward to the time of Gundelach, not much was added. With the annunciation, however, of Dzierzon's theory, a new era commenced; and though that theory encountered warm opposition, and excited a protracted controversy, it has triumphantly sustained itself, and led to further important discoveries. Hence the day cannot be distant when bee culture may, so far as the theory is involved, be regarded as having assumed an impregnable position.

In the earlier part of its career, the German Bienenzeitung had to contend with difficulties, such as will not have to be encountered here. Bee culture had long been a subject of general interest and study in Germany. Various theories had been framed, to explain the mysteries which its advocates recognized as existing; and the authors and adherents of these several theories, clung fondly to their preconceived notions, defending them oft with intemperate ardor. So long as it seemed conceded that any one of these theories might be true, and all of them were treated with equal deference, the Bienenzeitung moved along smoothly. But when Dzierzon advanced his new theory, though modestly submitting it at first in the form of an hypothesis, a different state of affairs ensued. The old schools felt intuitively that if this new doctrine be true, it involved the subversion and repudiation of all the subsisting theories. It was at once made an object of attack from all quarters; and a violent controversy, not

unmixed with acrimonious personalities, followed. Dzierzon defended his theory with great dialectic skill, for which his training and large experience in bee culture eminently qualified him. Then turning on his assailants, he exposed their fallacies and the inconsistency of their views, and arrayed against them the evidence of incontrovertible facts. Some of the old correspondents of the Bienenzeitung began to complain and remonstrate, and finally many of them withdrew. But the truth was rapidly making converts on every hand; and when Berlepsch, who had vauntingly denounced the new theory, proclaimed his conversion; and Kleine, Orttel, and other distinguished apiarians, became its advocates, a new and highly intelligent corps of contributors soon made amends for the defection. The impartial course of the Bienenzeitung, pending the controversy, was acknowledged; its policy vindicated; and, in its speciality, it now enjoys universal esteem. Difficulties like these, the American Bee Journal need scarcely apprehend. There are no cliques or parties here, advocating theories or systems which they cherish with the prejudice of paternal affection. Hence, though there may be differences of opinion, frank investigation will be acceptable to all, and intemperate zeal will hardly obtrude itself, with its unreasoning obstinacy.

In conducting this Journal, our aim will be to promote bee culture as a systematic practical pursuit, based on established principles and ascertained facts. In furtherance of this object, while we invite and will give scope to full and free, yet temperate and courteous discussion, we shall unreservedly, as occasion may require, express our own views and convictions—striving to place before the reader, the information requisite for intelligent judgment, on any topic that may claim attention or deserve notice.

We conceive that we have the means to render the Bee Journal both interesting and instructive; and our endeavor will be to make it not only a welcome visitor, but a valuable and reliable counsellor. It must, however, not be supposed that the paper is designed for those only who purpose engaging in bee culture on an extensive scale, and adopting the methods and processes so highly appreciated abroad. It contemplates more general usefulness, and will address itself with equal earnestness, to that much more numerous class, whose operations are necessarily restricted within narrower limits. The most certain means of securing progress, are to be found in that which will enable common bee keepers, who still use only the simple straw, to prosecute the business with due success and satisfaction—thus inducing them finally to join in the march of improvement. Hence, all, and such especially, are invited to communicate with us freely, stating any difficulties they may have to encounter, or any vexations they may experience in this pursuit; giving us an account of their own peculiar methods and manipulations; or relating whatever of new or strange, in this department, comes under their notice—their joys and sorrows, as apiarians; their successes as well as mishaps.

Our desire is, of course, that beekeepers, generally, would become readers and correspondents of the Journal; and that each should regard it, for himself, as a medium of imparting, as well as of receiving information. We ask them to send us their queries, their suggestions, their remarks, and their criticisms, as well as the results of their reflections and experiments. Let them here record their observations, and relate their experience; and much that is valuable cannot fail to be elicited for the general benefit. Let them derive a hint from their favorite insect, which by concord and co-operative industry, insures the prosperity of the colony.

THE HORNET. (Vespa Crabro.)

The hornet has ever been regarded as an inveterate enemy of bees. There are probably few observant beekeepers who have not seen them about the hives, suddenly seizing some luckless individual, clipping off the wings, and carrying away the body as a tid-bit for their brood. It has also been alleged that hornets have a special predilection for queen bees, and will even hunt and manage to seize them in the cluster, just after a swarm has settled. Till recently, however, I did not regard their hostility as in any respect of much consequence; but as they happened to be unusually numerous last season, I learned to know them better. I am now convinced that the hornet is to be classed amongst the most formidable enemies of bees, since, relying on its superior strength, it will boldly enter the weaker colonies, and occasionally, by robbery and murder, effect their destruction. Let me state some facts:

On a fine day last summer, I was standing near a small artificial colony, to which an Italian queen had been given several weeks previous. I watched it closely to see whether any young bees would issue. While thus engaged, I observed a hornet alight and enter the hive without the least hesitation. I immediately prepared myself to kill her when she reappeared; but as she remained in the hive more than five minutes, my vigilance became relaxed, and she succeeded in making her escape. I perceived, indeed, as she flew away, that she

was bearing off a bee, but did not then consider the circumstance as of any special importance. Studying to devise some mode of preventing such depredations in the future, I walked away, and returning in about half an hour, I found the entire population in commotion, exhibiting the clearest symptoms of queenlessness. I immediately opened the hive, and found that such was in fact the condition of the colony. Though I cannot say positively that I saw the hornet carry off the queen, I have not the least doubt that she did.

A few days later I again saw a hornet enter one of my hives, which contained a very weak *cast*, or third swarm, the queen of which was lost on her hymeneal trip. I had inserted a sealed royal cell, and the queen which emerged from it, returned safely from her excursion, to meet the drones, and was already fertile. Not valuing the colony very highly, I concluded to let the hornet continue her forays, and saw her frequently enter and depart. The colony soon proved to be queenless, the population decreased rapidly, and in the course of a week, the hornet ceased to repeat her visits. I now opened the hive, and took out the combs. There was not a bee to be seen, no brood, nor a trace of honey. The destruction of this colony, I attribute wholly to the depredations committed by the hornet.

I never yet saw a hornet enter the hive of a strong colony; and it might not be safe for her to attempt it. But many weak colonies have doubtless been made queenless in this manner, while the true cause remained wholly unsuspected.—KLEINE.

DWARF BEES.

In August, 1856, two of my small artificial colonies produced a large number of dwarf bees, scarcely larger than the smallest house-flies. Four of them hardly equalled an ordinary worker in bulk. It was amusing to see these Liliputian creatures sporting with equal zeal and zest among their full-sized mates, and laughable to see them returning to their hives with miniature pellets of pollen on their thighs, or darting forth with the fierceness of pent-up wrath, to repel the assaults of robbers. The sting inflicted by them was very painful. There were several thousands of them, and the greater part lived till winter set in. On examination, it was found that they had originated in a comb which had been broken off and slipped down between two others, so as to rest on the bottom of the hive. A large number of the cells were much compressed laterally, and hence, doubtless, the diminutive size of the workers which were reared in them.—LUBINIECKE.

SINGULAR OCCURRENCE.

A populous and well stored hive belonging to one of my neighbors, swarmed on the 14th of July, 1855. It sent off three distinct swarms in quick succession, and these had clustered separately on a tree, when I arrived at the scene. On asking from which hive they had issued, one marked No. 3, was pointed out. As I saw no bees at its entrance, I turned it up and found it completely deserted. While an effort was being made to hive the two smaller swarms, they rose and united with the larger; and in attempting to shake this down, the whole body rose in violent agitation, whirled around with great noise, and then suddenly returned *en masse* to the hive they had deserted, entered it and speedily became quiet. Under the places where the two small swarms had settled, two dead queens were shortly after found.—PESENBECK.

From Burton's "Lake Regions of Central Africa."

The country abounds with honey. Near the villages log-hives hang from every tall and shady tree. Bees also swarm in the jungles. Their produce is of two kinds—one found in the forests and stored in grounds, resembles European wasp-honey; it is more than half filled with dirt, and affords little wax; the liquid is thin and watery, and has a singularly unpleasant flavor. The other variety is hive-honey, which is very good if not kept too long, and supplies a yellow wax, which is used by the Arabs to mix with tallow in the manufacture of candles. Honey is the only sweetener in the country, except in the maritime and lake regions, where the sugar cane grows. The natives chew the sugar cane, without knowing the art of extracting the juice.

A DWARF QUEEN.

On the 28th of April, 1856, I made my second artificial colony of Italian bees. The queen reared by it, and which left her cell on the 16th of May, was so diminutive that she could scarcely be distinguished from the workers. Intending at first to discard her, I finally concluded to let her remain till I saw whether she would become fertile. Four weeks had elapsed before I found eggs in the cells, and singularly enough most of them were attached to the sides of the cells instead of the bottoms; and it seemed as though they had been dropped involuntarily, as she withdrew her abdomen from the cell. The few eggs regularly placed on the bottom of the cells hatched in due time, but the workers produced were very small. The eggs affixed to the sides of the cells did not hatch.—LIEBE.

The Dzierzon Theory.

We propose, on this occasion, to present to the reader, in the form of distinct propositions, the fundamental principles of Dzierzon's system of bee culture, as set forth by the Baron of Berlepsch, in his celebrated Apistical Letters; designing to furnish in the succeeding numbers of this Journal, a condensed statement of the facts and arguments by which these propositions are demonstrated. We do this because, though that theory is frequently spoken of, and some of its leading features are probably known, no detailed account has hitherto been published in English. Yet, without an accurate and familiar acquaintance with it, the practice of bee culture cannot be conducted with the judgment and skill requisite to justify an expectation of successful results. The practical operations must be based on and adapted to the theory, which, hence, becomes a proper subject of study.

The propositions, as laid down by the Baron of Berlepsch, are as follows:

First. A colony of bees in its normal condition, consists of three characteristically different kinds of individuals—the queen, workers, and (at certain periods) the drones.

Second. In the normal condition of a colony, the queen is the only perfect female present in the hive, and lays all the eggs found therein. These eggs are male and female. From the former proceed the drones; from the latter, if laid in narrow cells, proceed the workers or undeveloped females; and from them also, if laid in wider, acorn-shaped, and vertically suspended, so-called royal cells, lavishly supplied with a peculiar pabulum or jelly, proceed the queens.

Third. The queen possesses the ability to lay male or female eggs at pleasure, as the particular cells she is at any time supplying may require.

Fourth. In order to become qualified to lay *both* male and female eggs, the queen must be fecundated by a drone or male bee.

Fifth. The fecundation of the queen is always effected outside of the hive, in the open air, and while on the wing. Consequently, in order to become *fully* fertile, that is, capable of laying *both* male and female eggs, the queen must leave her hive at least once.

Sixth. In the act of copulation the genitalia of the drone enter the vulva of the queen, and the drone simultaneously perishes.

Seventh. The fecundation of the queen, once accomplished, is efficacious during her life, or so long as she remains healthy and vigorous; and she never afterwards leaves the hive, except when issuing with a swarm.

Eighth. The ovary of the queen is not impregnated in copulation; but a small vesicle or sac situated near the termination of the oviduct, and communicating therewith, becomes charged with the semen of the drone.

Ninth. All eggs germinated in the ovary of the queen, tend to develop as males, and do develop as such, unless impregnated by the male sperm while passing the mouth of the seminal sac or spermatheca, when descending the oviduct. If they be thus impregnated in their downward passage (which impregnation the queen can effect or omit at pleasure) they develop as females.

Tenth. If a queen remains unfecundated, she ordinarily does not lay eggs. Still, exceptional cases do sometimes occur, and the eggs then laid produce drones only.

Eleventh. If, in consequence of superannuation, the contents of the spermatheca of a fecundated queen become exhausted; or if from enervation or accident, she lose the power of using the muscles connected with the spermatheca, so as to be unable to impregnate the passing egg, she will thenceforward lay drone eggs only.

Twelth. As some unfecundated queens occasionally lay drone eggs, so also, in queenless colonies, no longer having the requisite means of rearing a queen, common workers are sometimes found, that lay eggs from which drones, and drones only, proceed. These workers are likewise unfecundated; and the eggs are uniformly laid by some individual bee, regarded more or less, by her companions as their queen.

Thirteenth. So long as a fertile queen is present in the hive, the bees do not tolerate a fertile worker. Nor do they tolerate one while cherishing a hope of being able to rear a queen. In rare instances, however, exceptional cases occur. Fertile workers are sometimes found in hives *immediately* after the death of the queen; and even in the presence of a young queen, *so long as she has not herself become fertile.*

These propositions, which embrace, substantially, the entire Dzierzon theory, are, in so far as they contain or propound anything novel, deduced from the personal observations and experiments of that celebrated apiarian. Several of them were warmly impugned by some of the ablest correspondents of the German Bienenzeitung. But Dzierzon alone, for a season, and the Baron of Berlepsch, the Rev. Mr. Kleine, and others, subsequently defended them with equal astuteness and vigor—adducing unquestionable facts in their support. The controversy was a very animated one; nor was opposition silenced till, by the introduction of the Italian bee, the means

of conclusively determining the chief points at issue were furnished. The evidence thus supplied was so clear and decisive, that all serious opposition ceased, and the truth of the positions was conceded by all intelligent apiarians. Naturalists and physiologists, however, continued to discredit and reject some parts of the theory, because they contravened so directly their own long-cherished views and opinions. But even they were ultimately constrained to yield to the evidence, when the facts as ascertained by Professors Leuckart and Von Siebold, no longer left room for cavil or doubt.

CHINESE MODE OF TAKING HONEY.

During my sojourn in this place, I had an opportunity of witnessing a novel mode of taking honey from bee-hives. The Chinese hive is a very rude affair, and looks very different to what we are accustomed to use in England; yet, I suspect, were the bees consulted in the matter, they would prefer the Chinese one to ours. It consists of a rough box, sometimes square, and sometimes cylindrical, with a movable top and bottom. When the bees are put into a hive of this description, it is rarely placed on or near the ground, as with us, but is raised eight or ten feet, and generally fixed under the projecting roof of a house or out-building. No doubt the Chinese have remarked the partiality which the insects have for places of this kind, when they choose quarters for themselves, and have taken a lesson from circumstance. My landlord, who had a number of hives, having determined one day to take some honey from two of them, a half-witted priest, who was famous for his prowess in such matters, was sent for to perform the operation. This man, in addition to his priestly duties, had charge of the buffaloes which were kept on the farm attached to the temple. He came round in high glee, evidently considering his qualifications of no ordinary kind for the operation he was about to perform. Curious to witness his method of proceeding with the business, I left some work with which I was busy, and followed him and the other priests and servants of the establishment to the place where the hives were fixed. The form of the hives, in this instance, was cylindrical; each was about three feet in height, and rather wider at the bottom than the top. When we reached the spot where the hives were placed, our operator jumped upon a table placed there for the purpose, and gently lifted down one of the hives, placing it on its side on the table. He then took the movable top off, and the honeycomb with which the hive was quite full, was exposed to our view. In the meantime an old priest having brought a large basin, and everything being ready, our friend commenced to cut out the honeycomb with a knife made apparently for the purpose, having the handle almost at right angles with the blade. Having taken out about one-third of the contents of the hive, the top was put on again, and the hive elevated to its former position. The same operation was repeated with the second hive, and in a manner quite satisfactory. But it may be asked, "*Where were the bees all this time?*" and this is the most curious part of my story. They had not been killed by the fumes of brimstone, for it is contrary to the doctrines of the Buddhist creed to take away animal life; nor had they been stupefied with fungus, as is sometimes done at home—but they were flying about above our heads in great numbers, and yet, although we were not protected in the slightest degree, not one of us was stung; and this was the more remarkable, as the bodies of the operators and servants were completely naked from the middle upwards. The charm was a simple one; it lay in a few dry stems and leaves of a species of Artemisia, (wormwood,) which grows wild on these hills, and which is largely used to drive that pest, the mosquito, out of the dwellings of the people. This plant is cut early in summer, sun-dried, then twisted into bands, and it is ready for use. At the commencement of the operation, which I am describing, one end of the substance was ignited and kept burning slowly as the work went on. The poor bees did not seem to know what to make of it. They were perfectly good-tempered, and kept hovering about our heads, but being apparently quite incapable of doing us the slightest injury. When the hives were again properly fixed in their places, the charm was put out, and my host and his servants carried off the honey in triumph.—*Fortune's China.*

BEES AND GRAPES.

I noticed last year, for the first time, that the bees eagerly visited my grapes when ripe, and felt willing to excuse their supposed depredations, because the previous spring and summer had been very unpropitious to their honey-gathering vocation. But, on more closely scrutinizing their proceedings, I found that in no instance did they attack sound fruit, even when perfectly ripe, but contented themselves with gleaning in the wake of more powerful marauders. I saw that they invariably alighted on such fruit only as had been pecked by birds or punctured by wasps and hornets. I never perceived a bee attempting to injure sound fruit. Those kinds of grapes which were not attacked by birds, wasps, or other insects, remained unvisited by the bees.—H. H. K.

The Worker Bee.

If we examine a hive in the months of May, June, or July—the busy season of the year, when the population has attained its fullest development—we shall find therein three distinct kinds of bees; a queen, a large number of drones, and many thousand workers. Later in the season, usually after the first of September, the population will be found to consist of the queen and workers exclusively, as drones are not then tolerated in healthy colonies.

It were superfluous to describe the worker bees minutely, as all who take an interest in the subject, have doubtless frequently observed them in the vicinity of the hive, or when gathering honey or pollen, from the flowers of the field.

They are not inappropriately called *workers*. Though the queen is by no means an idle or inactive inmate of the hive, and lays all the eggs from which the young bees spring, the workers perform all the other labors of the colony. They cleanse the interior of the dwelling, by removing thence all impurities; they close with propolis the cracks or crevices which might harbor worms or moths, or allow the escape of heat from within: they build the combs, nurse the brood, guard the hive, and provide all the honey, pollen, propolis and water needed in the economy, or essential to the prosperity of the colony.

Though each individual worker is or can become qualified to perform, in an emergency, all these several labors, yet ordinarily there is a subdivision of employment among them. Their duties may properly be classified under two heads—the internal or domestic, such as the production of wax, the building of comb, the nursing of brood, the capping of cells, and the garnering up of honey and pollen; and the external or foreign, such as the gathering of the substances and materials requisite for the support and welfare of the associated body. Those bees which attend to the domestic duties, rarely leave the hive except for exercise; whilst the others are almost constantly on the wing, "from morn to dewy eve," gathering stores when such are to be found, and the weather permits them to go in quest of the coveted spoil. They scarcely take time to deposite their appropriated sweets in the destined receptacle, but hastily transferring them to the charge of their home-keeping sisters, they speed forth anew to forage the inviting fields and sip the nectar of each expanded flower. He who fancies that the bee which has just returned from a successful excursion, applies its contributions of pollen or honey directly to their destined use, elaborating wax, building cells, or preparing chyme for the brood, entertains erroneous views. The gathering bees would, for the time, be almost wholly unfitted for such tasks as these. To prepare chyme, or secrete wax, the bees must previously consume a portion of pollen mixed with diluted honey, and then await, in the elevated temperature of the hive, the gradual processes of digestion and conversion. At such times their stomachs are so surcharged with these substances, that they are scarce able to fly, and they feel no disposition to sting. When, on opening the hive, other workers rush out, "on warlike deeds intent," these retire timidly to the interior, and their entire deportment resembles that of the timid and fugaceous queen, whose more constant attendants they are. These "drudges of all work," are the younger bees. On them, during their minority as it were, all the cares and toils of the home department are devolved; and for them as yet, the beauties of external nature have no attraction. Even honey, that coveted nectar, to appropriate which they will subsequently hazard life itself, is for them, at this early stage of existence, no enticing lure. The overweening fondness for it displayed at a later period, is with them literally an *acquired* taste. A bee just hatched will turn from it with decided unconcern, if not real disgust.

The older and far more numerous portion of the population are, in fair, mild weather, engaged from dawn to dusk in out-door pursuits, exploring the surrounding country in search of stores. The stomachs of these more actively employed bees, are nearly empty when they leave the hive, and their bodies are hence lighter and better fitted for rapid flight and distant excursions. Returning with laden thighs and well-gorged honey bags, their flight is obviously slower, and their motions more sluggish. At night, and sometimes during the day when the weather prevents them from going abroad, they hang in clusters from the combs; or if the heat within be great, they crowd about the entrance of the hive, and gather in masses on its front. When disturbed or annoyed, they do not, like the others, timidly retire, but at once assail the intruder intrepidly and repel him with their stings. But they rarely manifest any interest in the domestic concerns of the family; and if separately hived and deprived of their queen, they can scarcely be induced to rear a successor, to replace their lost sovereign, even when furnished with suitable brood. They

have, it is true, a home which they love and cherish—which they delight to replenish with nature's most luscious sweets, and for the defence of which, they are ever ready to sacrifice life itself; but it is a home swept and garnished for them by *the rising generation*, whose habits and instincts are, as yet, almost entirely dissimilar to theirs.

Who divides these workers thus into two distinct classes? Who orders this subdivision of their labors? Who inspires one portion with home-keeping propensities, and directs their attention to domestic duties; and impels the others to roam abroad for supplies and provide stores for autumn and winter? He, who framed their bodies and infused their instincts. Their actions are not the results of reflection and choice, but of those innate impulses with which THE CREATOR has endowed them. What they do, they do unbidden, impelled thereto by an inborn industry actuated by different predilections, and assuming different tendencies at different stages of life, yet co-working, from first to last, for the common good. The younger, more delicate and more sensitive of atmospheric changes, attend by preference to the domestic employment; and as they advance in age, they pass gradually over into the rank of the elders, recruiting their diminished hosts, by supplying the place of the multitudes which daily perish. At first they come forth only during the warmer hours of the day, when the drones sally out, and young queens make their nuptial excursions. Subsequently they join the foraging parties, new propensities begin to be developed, their earlier habits are transformed, and instead of mainly creeping and crawling they now mount and fly. Though it would seem that to the aged bees, whose wings have become mutilated and whose bodies are toil-worn, the domestic duties might now properly be assigned, such is not the fact; and these precisely are the most indefatigable purveyors, the most sedulous laborers abroad, perishing ultimately, for the most part, from sheer inability to fly—owing to the lacerated condition of their wings.

A knowledge of this difference in the department of the workers, at different periods of life, is of much practical importance, because it can be advantageously availed of in many operations in bee culture. When, for example, a portion of the workers are to be transferred from a strong stock to an artificial colony, it would be highly injurious to the parent stock if the removed portion were composed mainly or altogether of old bees, which for the time constitute its most active and reliable *gathering force*. These, which would at all events, not long survive, had better remain, and be allowed to labor on their old foraging ground, in their accustomed range or *beat*. Comb-building will, for some time, be the main business of the new colony, and for this department of labor, the old bees are comparatively valueless. The younger bees will answer better, and these besides, having for the most part never left the parent hive, will all the more readily adhere to their new home, wherever that may be placed. They will also turn their attention to honey gathering much sooner than they would have done, if they had not been removed. Hence the bees needed for such transfer, should be taken at a time when the workers are flying briskly and large numbers are engaged in foraging. Nor need it be apprehended that the brood in the parent hive will suffer, or any essential labor be neglected in consequence of such removal, though the larger portion of the workers be transferred. In a strong hive many more bees will still remain than are absolutely necessary. The work, also, which previously occupied the time and attention of perhaps twelve thousand bees, will now be easily performed by six thousand, laboring with redoubled zeal. The older bees among those transferred will also return to the parent hive, and the brood emerging from day to day will soon adequately replenish its population. Thus the equipoise will speedily be restored, or rather, the proportion of producers and consumers will be more suitably adjusted, for the smaller the number of bees by which the internal concerns of the hive are managed, the less will be the proportion of stores consumed and the more can be garnered up. When a pretty strong swarm is driven out of a populous hive and removed to a distant stand, scarcely any diminution of activity will be perceptible, if the parent hive be left on its old stand. The older bees, accustomed to foraging, will not confine themselves within, if pasturage abounds and the weather be favorable to their labors; and the younger portion, though greatly reduced in number, will still be able, by increased exertions, to nurse the larvæ, while the heat of the hive will suffice to mature the sealed brood. These younger bees, thus occupied with domestic duties, may easily be known by their somewhat lighter color and their perfect wings; but they may be still more readily distinguished in a hive of common bees, whose queen has been removed and replaced by an Italian queen. In about twenty days after the substitution, young Italian bees will begin to emerge; but another week will elapse before these will show themselves outside of the hive, and then at first only among those which, at about noon on

fine days, issue for exercise. If the hive be now opened, Italian workers will be found within, almost exclusively occupied in building and repairing combs, whilst the older or common bees are almost *en masse* abroad, engaged in foraging. But thenceforward, the number of Italian bees, participating in out-door labors, will increase from week to week, or rather from day to day; and the common bees will be continually decreasing in numbers, till in the course of three months they will have almost altogether disappeared. This process likewise furnishes the most convenient opportunity to ascertain the comparatively brief duration of the worker's life, because the period at which the old race becomes extinct, or has been entirely supplanted by the new, can thus be determined with much precision. It is, however, not a definite period, but occurs earlier or later, according to season and circumstances. If for instance, an Italian queen be substituted in September, the old race will probably not entirely disappear before the ensuing May or June. But if the substitution be made in June, scarcely an individual of the old race will be found in the hive after September, though during the first three weeks none but common bees emerge from the cells. For in the months of June, July and August, more workers are "used up" by incessant toil in their ordinary labors, thus exhausting their physical strength, than in the seven months succeeding. In autumn and winter they remain for the most part inactive, enjoying uninterrupted repose, after a protracted season of wearying toil; their bodily vigor, like that of the queen, which lays few eggs during this period, remains untaxed and unimpaired; and they may hence be said, not to grow older in the interval, though really advancing months in age.

The question—"How long may a worker live?" does not, consequently, admit of a precise and definite answer. Under favorable circumstances, as for instance, in a queenless colony, in which the bees, even in summer, are comparatively inactive, and may be said to *vegetate* rather than *live*, the worker might possibly survive for a year, unless perishing from accidental causes. Those bred in autumn usually live about nine months; whereas those bred in the spring rarely live more than three months. Hence we may assume six months as the fair average duration of the worker's life. In busy seasons the wings soon become lacerated and unfitted longer to subserve their proper functions, and the poor bee must then as certainly perish as any animal whose vital organs are diseased. When Baron Ehrenfels conjectured that if the worker escape the common casualties and constantly recurring dangers to which it is necessarily exposed, it *might* live as long as a queen, he would have been right if he had simply added that such would be the case if the worker were a queen. A queen may undoubtedly be reared from any worker egg; but if the larva be reared as a worker it will have instincts correspondent to its mission, and the duration of its life will be determined by its habits and labors. Even the period of development is different in each, and is in each in the reverse order of the duration of life. The queen, attaining to much greater age, is perfectly developed in the brief term of sixteen days. The worker requires twenty-one days for its maturation, and yet, lives hardly as many months as the queen does years. The drone needs the still longer term of twenty-four days, and yet, is literally *cut off*, after a shorter existence than either of the others—many being doomed to premature destruction, as the last generation is frequently torn from its cells, as larvæ, and cast out of the hive. The habits and mode of life of the worker differ likewise essentially from those of the queen. The latter feeds only on pure honey, never like the workers consuming pollen in its crude state; and she never suffers from dysentery or foul-brood, even when the entire colony is affected by those diseases. Certainly, no reliable inference can be drawn as to the possible duration of the worker's life, from the actual age which queens are known to attain. If Baron Ehrenfels had enjoyed an opportunity to institute experiments with Italian bees, he would speedily have changed his opinion.

As it has been demonstrated for more than a century past, that a queen can be reared from any worker egg, it is certain that all the workers are originally of the female sex, though undeveloped, or rather checked or arrested in their development. Dissection has, moreover, shown that they possess mere rudimentary ovaries and scarcely a trace of a seminal sac or spermatheca. They are, consequently, physically unsusceptible of fecundation. In rare instances, however, some of them, from causes or influences not yet clearly ascertained, are enabled to lay eggs which produce drones only. These have been denominated *fertile* workers; and as they are commonly found only in queenless colonies, or in second swarms, it has been supposed that they may, while in their larva state, have received either accidentally or otherwise, a portion of the peculiar pabulum prepared for the larva reared as queens in royal cells. But this is mere conjecture. The fact, however, that their eggs produce drones only, shows that in their essential nature they resemble

the queens; as it is well ascertained that the eggs of unfecundated queens also produce drones exclusively, as will be shown hereafter.

The worker bee is provided with a sting, which is universally dreaded as a formidable weapon of offence. The mere fear of it suffices to deter many from engaging in bee culture; though this admirable insect is by no means so irritable and vindictive as it is generally supposed to be. It seldom or never stings without cause or provocation. Still its anger may easily be excited by improper treatment or rough usage. Rapid motion in front of the hive, obstructing the flight of departing or returning bees, breathing on them when clustered, and beating against their hive or its bottom board, are annoyances which excite their ire, and should be carefully avoided. Various odors, the natural exhalations of some persons, and the effluvium of their own poison when discharged, rouse their animosity and inflame their rage. Though they may usually be subdued by the use of smoke, such as is produced from rotten wood containing the larvæ of insects, it is exceedingly offensive to them, and should never be employed.

Nor are bees equally irritable at all times or seasons. In the cool of the morning, in the dusk of the evening, and during rainy weather, though they are not likely to become assailants, it is not advisable to undertake protracted operations among them, as they are more apt to become unmanageable when roused to full consciousness and life, from temporary repose. The foraging bees, also, being then *at home*, and more disposed to sting than the others, there is danger of having to encounter the ireful displays of a more numerous and fiercer host. When it becomes necessary to work among them, it is best to select noon, or the time of their busiest flight, for the operation, unless there is reason to apprehend that robbing-bees may be attracted to the scene. Every ebullition of anger, however slight, should be instantly repressed and subdued by the use of smoke, which, if properly employed, will keep them in subjection.

Bees are likewise peculiarly irritable and much disposed to sting, when their colony is queenless, or they are engaged in rearing queens. Interference with them at such times, especially if the brood-combs which contain the royal cells are disturbed, will excite their anger. The entire colony is, during such periods, in a state of comparative uneasiness, which culminates when the young queen is emerging from her cell, or making her nuptial excursion.

But the genuine apiarian must have no fear of the bee's sting, to which, moreover, his system will soon become accustomed to such an extent that the infliction is rarely followed by unpleasant consequences. The speedy removal of the sting, and the frequent application of spittle to the wound, are all that is really needed in most cases. Some persons, indeed, are constitutionally liable to suffer greatly from the pain and inflammation. These should either avail themselves of the protection afforded by a bee-dress, or forego the pleasures of apiarian pursuits, unless they can procure a stock of the more peaceably disposed Italian bees.

LARGE DEPOSIT OF HONEY.

A somewhat singular discovery was made a few days ago, in the house occupied by Mrs. Gen. Wingate, on the corner of Spring and High streets, St. Louis. The *Argus* has the following account of the story:—"The inmates of one of our largest up-town mansion houses, a few days since were surprised to find a large number of bees flying about in two of the upper rooms. As the little fellows continued to occupy the places, a bee naturalist was sent to investigate the matter.—On entering the rooms, he exclaimed:—"You have honey somewhere here," and proceeded to search for it. On removing the fire-board, he discovered that one flue of the chimney was full of honey-comb; which was hanging down into the fire-place, and the honey dropping from it; proceeding to the top of the house to sound the chimney, he found it the same; one flue of the chimney was full, and the bees were industriously at work there also. These flues of the chimney had never been used; they were plastered smooth inside, and were perfectly dark, a stone having been placed on the top of each flue. The bees had descended the adjoining flues, and found small holes about ten inches from the top of the chimney, leading into the closed flues, and through these holes they had made their way in and out. They have, as is supposed, occupied these places for three years, having been kept warm in the winter by the heat from the adjoining flues. On removing the fire-board, the bees, seeing the great light which had broken in upon them, descended to the room and gathered on the windows, until they were covered to the thickness of three inches. It is estimated that there are in the two flues from 40,000 to 50,000 bees, and from two to three thousand pounds of honey."

"He may be regarded as a master in bee culture, who knows how to winter his stocks in a healthy condition, with the least loss of bees, the smallest consumption of stores, and with the combs unsoiled."

DEVELOPMENT OF THE WORKER EGG.

The eggs of the queen bee are ovoid-oblong in shape, and of a pearly-white color. They are laid in the cells of the comb by the queen, and attached to the bottom of the cell at their lower end, by means of a glutinous substance with which they are covered. They are hatched by the heat of the hive concentrated within the brooding space, by the bees clustered on the combs. The larvæ emerge from the eggs in the course of from forty to sixty hours after these are laid; the time being longer or shorter according to the temperature maintained in the hive. The emerged larvæ lie at the bottom of the cell, in a curved form, and are immediately fed by the workers, with a pellucid jelly, prepared in their chyle-stomachs by the digestion of honey and pollen mixed with water. The food is thus a finely edulcorated substance, which the larvæ can easily digest, and which they assimilate so perfectly that no excrementitious matter accumulates in the intestinal canal. This is an important provision, as the larvæ could not void fæces till they reach their full development as insects.

The larvæ grow rapidly, and in six days attain such size as to be no longer able to lie in a curved form on the bottom of the cell, and now stretch themselves out lengthwise. As soon as this occurs, the workers close the mouth of the cell with a waxen cap or cover, performing the work with great celerity. As the larvæ are fed during six days, if we now assume that the queen lays, on the average, only 500 eggs per day, the workers have to provide food for 3000 larvæ daily. Eight days elapse from the time the egg is laid till the cell is capped. On the ninth day the larva is fully stretched out, and then begins to coat over the internal surface of the cell with a whitish gummy liquid, which rapidly dries and becomes glossy. She first gums over the inside of the cap or cover; then curving back the anterior portion of her body, she gums the upper half of the cylindrical cells, from front to rear, with the liquid, which issues from an orifice directly below her mouth. Her body becomes elongated and much attenuated, as her head moves onward towards the base of the cell, which point being reached, the head is directly over the tip of her tail, and she lies completely doubled up in her waxen prison. It is only by thus elongating and attenuating her body, that the larva becomes able to turn herself within her narrow cell, in order to gum the lower half likewise—proceeding now from rear to front. When her head has again reached the cap, she gradually turns her body again on its axis, and then lies stretched at length, with head in front, and mouth downward, ready to undergo transformation to a nymph or chrysalis. Between the tenth and eleventh days the mandibles make their appearance in the chrysalis; on the twelfth day the head and thorax begin to protrude—though the head appears as if still infolded within the thorax, the latter being yet imperfectly developed. The insection between the thorax and the abdomen is scarcely perceptible; and the legs and wings are not yet visible. At the close of the thirteenth day, the insection between the thorax and the abdomen is perfectly formed; the legs, wings, antennæ and proboscis begin to make their appearance; and on the fifteenth day these are complete, though the wings are still small, and lie on the thorax in the direction of the first pair of legs, and are thus scarcely observable. In this stage of its advance, the insect is very soft, and perfectly white. On the sixteenth day, the several parts have become fully developed; the eyes begin to assume a brownish hue; and the proboscis lies extended under the thorax. On the seventeenth day the eyes become black, and the wings are almost fully unfolded. On the nineteenth day the insect is in all respects fully developed, though its color is still somewhat grayish; the proboscis is inclosed in its sheaths, but the abdomen remains infolded in the nymphal envelope. On the twenty-first day the bee is mature, its limbs have become firm, and the body has assumed a brownish hue; the nymphal envelope has been stripped off, and lies at the bottom of the cell, as a pellet about the size of a pin's head.

Thus, in the process of transformation, the anterior portion of the bee's body seems to *grow out of* the chrysalis, because the nymphal envelope remains nearly stationary, or seems rather to retrograde slightly, on the abdomen. The envelope itself, which is exceedingly thin, dries up on the abdomen of the bee, and is then pushed back by means of the feet and legs. When stripped off, it is so shrunken or compressed, as to form a scarcely visible pellet. On the twenty-first day the bee cuts through the cover of the cell with her mandibles, requiring about forty-five minutes for the operation, and then issues from her confinement. She first puts her wings in gentle motion, to give them their due shape and position, as they had necessarily been much compressed in the narrow cell. The hirsuties with which her head and thorax are covered, have still a grayish hue, by which the eye may readily distinguish recently hatched bees from their older companions, though they speedily become darker. The young bees do not immediately leave the hive, or engage in the gathering

of honey or pollen; but remain within about a week longer, employed first and principally in nursing the brood.

In very favorable weather the worker bees may emerge in twenty days from the time the eggs are laid; but ordinarily twenty-one days are required for the perfect development of the insect.—GUNDELACH.

STRUCTURE OF THE BEE'S CELL.

A patient consideration of the properties of the cube, and its position, has led Mr. C. M. Willich to the fact that the geometrical solid, formed by the union of two cubes, having a dodecahedron with twelve rhomboidal faces, produces angles affording the greatest amount of resistance.

The obtuse angle of the face of this dodecahedron, produced by the union of two cubes, as above-mentioned, is the prime angle which affords the greatest resistance to water pressure in a dock-gate.

The partition of another regular solid body, the tetrahedron, effected by cutting off from smaller tetrahedrons of half the length of the base, will leave the platonic or regular octahedron, whose eight faces are equilateral triangles—and these faces we find incline to each other at an angle of 109° 28′ 16″, thus arriving at the same angle, although we make use of two very different simple solids—the cube and the tetrahedron. There are other curious interchanges, as in the partition of the dodecahedron, the taihedral summit forms one-fourth part of a tetrahedron.

The laws of nature are always simple. We might therefore be led to expect that the same angle which is the best for the dock-gates, should be precisely the same as that of the trihedral roof of the bee's cell. The mode of arriving at the angle of the bee's cell, Mr. Willich has shown in a letter inserted in *The Literary Gazette* of the 9th of July, explaining the manner of constructing the bee's cell, and of obtaining the angle required—and from which the following is an extract:

"I am now anxious to announce that I have succeeded in dividing the cube into several geometrical solids, with which many definite and regular geometrical bodies may be constructed.

Perhaps one of the most curious is that of the bee's cell, which is in fact an elongated dodecahedron, and consequently the angles of the trihedral roof and base, respecting which so many learned investigations have been made, can be no other than those of the true geometrical solid.

Without the aid of diagrams it is not easy to make the forms of solids clear to the mind in a popular way.

A cube may be divided into six equal and uniform bodies, in two different ways:

First.—By lines from the centre to the eight angles of the cube, which will give six four-sided pyramids.

Second.—By lines from one of the upper angles of the cube, drawn diagonally to the three opposite angles, dividing the cube into three equal and uniform solids. Each of these solids being halved forms a left and a right-handed solid. These six solids, though equal in solidity, differ so far in shape, as three are left-handed and three right-handed, in the same way as the hands of the human body.

Each of the six bodies obtained by the second mode of partition, may be divided into two of equal solidity and of similar shape. Two of these bodies, each being the one-twelfth of the cube, may be so united as to produce the pyramid obtained by the first mode of partition. Six of these bodies, each being one-twelfth part of the cube, may be so arranged as to form the oblique rhomboid.

For the present investigation we will not proceed further than the solid thus obtained, being the one-twelfth part of the cube. By this body, by using a different number and mode of arrangement, may be produced a variety of symmetrical geometrical forms in addition to the following:—

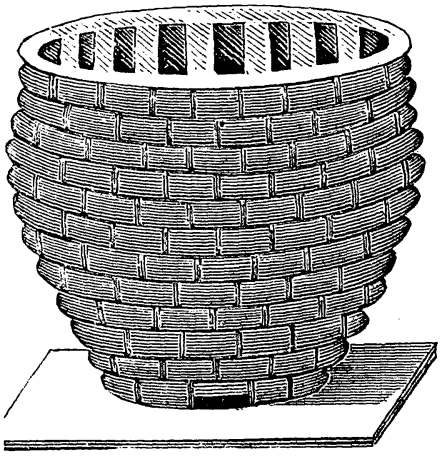
1. The cube consists of twelve of these bodies.
2. The octahedron consists of four of these bodies.
3. The oblique rhomboid consists of six of these bodies.
4. The dodecahedron consists of twenty-four of these bodies.
5. The dodecahedron also consists of four oblique rhomboids—or two cubes and six octahedrons.

The bee's cell consists of seven oblique rhomboids, or forty-two half pyramids. It is therefore evident that the bee's cell is an elongated dodecahedron.

It may be observed that the pyramid, or one-sixth of the cube obtained by the first mode of partition, may be divided into four bodies, each of which is one-third of a cube, containing one-eighth of the mass of the cube from which it was derived. So that, in fact, we may go on dividing and reproducing bodies of similar shape, and still retaining the diagonal lines of the cube. How far this subdivision may be carried in nature, or how much further than our powers of vision go, I will not at present venture an opinion. We can imagine that the commencing atoms may be infinitely small, when we remember the wonders revealed by the microscope."

Hives.

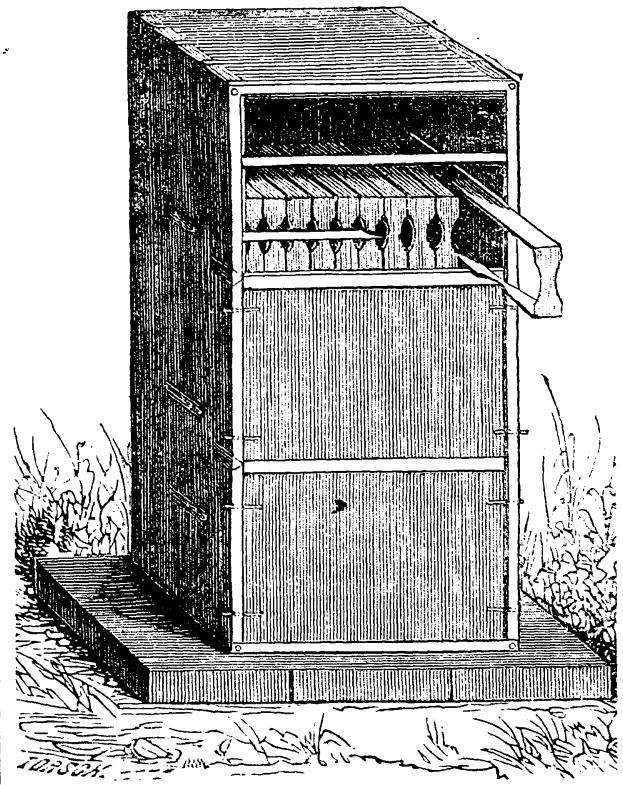
The beekeepers in the Greek Islands have from time immemorial used *bars*, adjusted across the tops of their hives, for the attachment and support of the combs. This may be considered as the earliest approximation to bee culture with movable combs. But, from what is known of their manipulations and processes, those beekeepers do not appear to have availed themselves in practice, of the facilities which even this slight improvement placed within their reach. Hives, with bars similarly arranged, have long been in use in Favignano, the "Blackwell's Island" of Sicily, and were probably introduced there from Greece. They are as clumsily constructed as those of the Greeks and used in the same inefficient manner. Christ, in Germany, and Golding, in England, constructed hives partially of this description, but seem to have regarded the bars



Improved Bar Hive.

as of only secondary importance—a mere convenience in the storifying system, of which both were strenuous advocates. Huber appears to have been the first who had a glimpse of other and more important advantages which might be derived from such an arrangement, and this led him to construct his celebrated leaf hive, which must be regarded as the next decided advance toward the introduction of a movable comb hive. Still it was with him only the *beau ideal* of an experimenting or observing hive, and as such he employed it. Morlot subsequently modified the leaf hive in some respects, adapting it better for practical use; and enthusiastically urged its general adoption in bee culture. He saw very clearly the importance of having command of the combs and control of the bees. But his modification came short of enabling him to attain his object. The inherent defects of this improved hive, and the consequent inconveniences attending the use of it, prevented it from finding favor, even temporarily, with any but a small number of amateur beekeepers. "Not the least practical benefit resulted from the improvement," says a highly competent critic, when incidentally adverting to Morlot's hive.

Next in order came Jähne's annular hive, composed of a series of hoops or rings, one inch in breadth, and ten inches in diameter, set half an inch apart in a triangular frame, and enclosed within two semi-cylinders of wood or straw. This device was found to present no advantage over the preceding, and its sanguine inventor failed to *write* it into favor. The Russian or Propokovitsch hive was invented at about the same period (1841.)

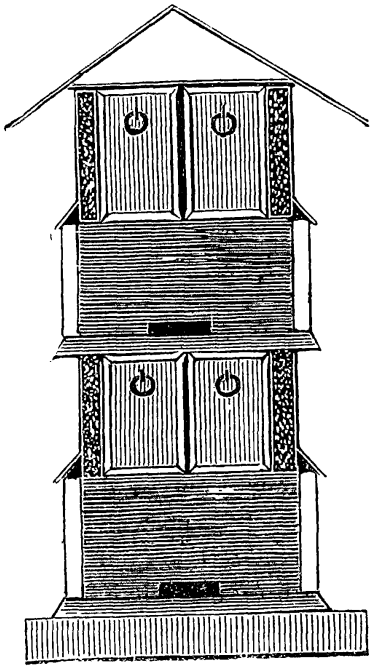


Propokovitsch Hive.

This was a further attempt to employ movable frames, so that each might be taken out or inserted at pleasure. The frames were placed side by side, with a small space between them, thus admitting of a horizontal motion when shoved in or drawn out. The hive had three compartments or stories, each of which contained a set of frames; but the important feature, "the leading principle" of the contrivance, consisted "in the capacity of the hive to be *reversed* or turned *upside down*"—an operation which was alleged to "lead to the most important results in the management of bees." In populous colonies, however, it was found that the filled frames could not be drawn out without crushing great numbers of bees, and so irritating the rest as to render them unmanageable. The difficulty was still greater when the bees cemented the frames to the top and sides of the hive with propolis, as they almost invariably did. None

but experienced apiarians, like its inventor, could work the hive, and it fell into deserved discredit.

The next invention, and that which alone received general approval and acceptance in Europe, was Dzierzon's movable bar hive, first publicly announced in 1845, but long previously in use, and fully tested in the inventor's own apiaries. In its original form it was a simple oblong box, thirty inches long, nine inches broad, and fifteen inches high, the ends being movable battened doors. Two corresponding grooves were cut in the inner sides, half an inch from the top, in which were placed, at intervals of half an inch apart, a series of cross bars or slats fitted up with pieces of empty comb, as guides for the bees. The entrance was on one of the sides, midway of its length, and one inch from the bottom. In building or extending the combs, the bees attach them to the sides of the hive. These attachments have to be severed when the bars and combs are to be taken out. As the ends of the bars are confined by and can only slide in the grooves, the combs must be taken out consecutively, and an interior comb can be reached only by removing all the anterior ones. With his hive substantially thus constructed, though with various modifications, that celebrated apiarian made all his observations and discoveries; and he still operates with it exclusively in his extensive apiaries. Its chief defects are that it requires the lateral attachments of the combs to be severed before removal, and that the bars can only be taken out consecutively. Dzierzon himself does not regard these as defects or objections. By long practice, he has become so expert in his processes, and so habituated to the use of his hive, that he is not willing to concede that a change in these respects would be an improvement. The preceding cut presents a view of the exterior of his hives, as he arranges them under cover, in three tiers of two each, placed back to back.

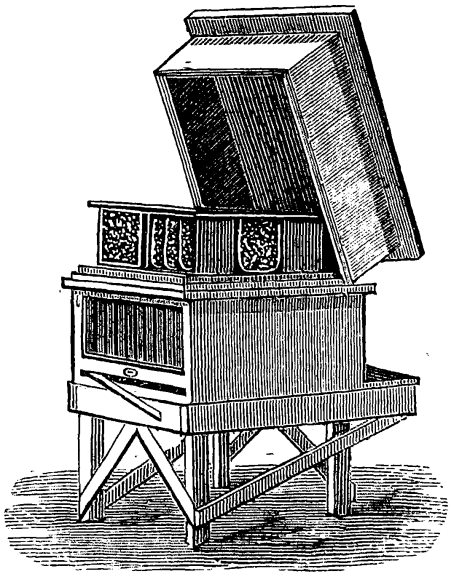


Stack of Dzierzon Hives.

By a more recent modification, or the introduction of what he calls *double* or *twin* hives, he effects a saving of material, facilitates the multiplication of colonies, and secures for his bees greater protection against the severity of winter. These he regards as, for practical purposes, the best form of hive yet introduced in Europe.

Several years after this, M. Debeauvoys introduced a hive in France, which may be regarded as a further advance in the right direction; but as still falling short of supplying the desideratum sought. It is inconvenient in form and complicated in structure. Separate frames, it is true, are provided for the combs, but they are awkwardly shaped, difficult to be inserted or removed, and can only be taken out consecutively like the bars of Dzierzon's hive. M. Deabeauvoys had undoubtedly a dim conception of the value of a movable comb hive, but he failed to devise one that could be advantageously used. His hive was *an approximation* to what was wanted, and that is all that can be claimed for it on the score of merit.

This was the stage of improvement which had been attained in Europe, when the Rev. Mr. Langstroth invented and introduced his movable comb

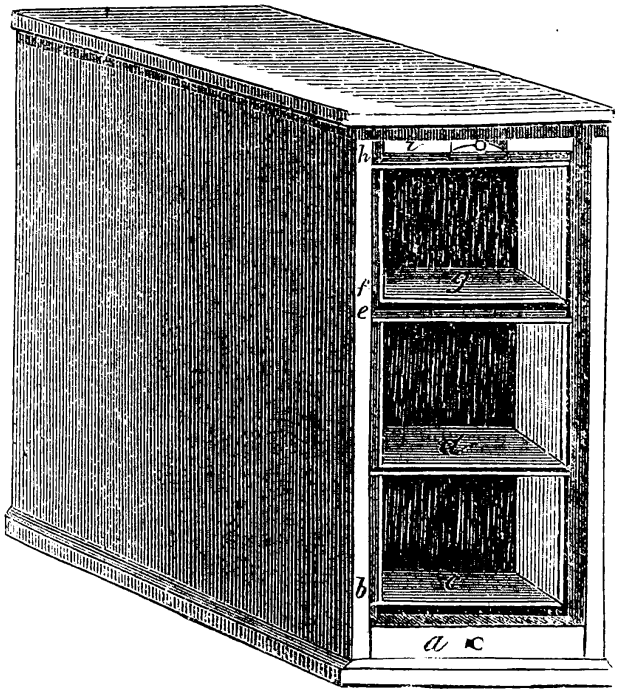


One-story Ornamented Double Glass Hive—rear view.

hive in this country. This hive, in its ordinary form, is of the most simple construction; and, together with the frames, may easily be made by any one accustomed to use carpenters' tools. It can be made of any size or form which experience or experiment shows to be advantageous. It is opened from above, and any frame may be removed or replaced at pleasure, so that the bee-keeper has perfect control of the combs and the

bees. The mode of managing it and performing with it any operation required, can be learned without difficulty. Nor is there any conceivable advance or improvement in bee culture, to which it is not completely adapted.

One of the defects of the Dzierzon hive—the impossibility of removing the combs without severing the side attachment—was so obvious, that a remedy was early sought, and in 1855, the Baron of Berlepsch adopted frames similar in principle, though slightly differing in construction from those of the Langstroth hive. These enabled him to remove the combs without cutting, and with ease. But his frames are troublesome to make and costly besides—two objections which operate against their introduction into use. An expensive hive, however good it be, is an article of luxury in which common beekeepers are not



Berlepsch Hive—rear view.

much disposed to indulge. Moreover, though the Baron's frames facilitate the removal of combs, the necessity of removing them in succession, to get out the hinder or any intermediate one, remains as before, and must ever constitute a serious objection to that form of hive. In Germany, where land is dear and timber scarce, the system of piling hives on and against each other was adopted, and is adhered to from the necessity of the case. But in this country, where matters are totally different in these respects, we can afford and may well prefer to place our hives separately, so as to have them and their contents conveniently accessible from every quarter.

As we shall have occasion hereafter to advert to several of these hives, we content ourselves for the present with thus noticing them in their chronological order.

GREEN HONEY.

Several years ago Dr. Küchenmeister found some green honey in a hive at Seerakowa. The owner of the hive, an intelligent beekeeper, was of the opinion that the honey was from the juice of grapes, which the bees had gathered plentifully in the preceding autumn. Though the source of the honey was thus surmised, and its peculiar color was attributed to the bluish-green bloom with which the grapes were dusted, it was subsequently admitted that the true cause of the color was not satisfactorily ascertained.

In the fall of 1859, I had an opportunity to observe bees foraging on the Early Burgundy grape, and likewise on plums and prunes, which had been gathered and brought to my house. It was difficult to keep the bees away from the baskets, and they were ever ready to alight even on the fruit which I held in my hand. Yet I could not discover that the honey they were storing up in their cells, had a green tinge; and the conjecture of Dr. Küchenmeister received no support from my observations at the time. But subsequently, when I removed the combs containing that honey, and noticed that that which flowed from the ruptured cells was of a *beautiful green color*, I changed my opinion. As the two occurrences thus observed were attended by similar circumstances, and the results were similar, we have reason to believe that the peculiar color of the honey has been traced to its true source. Still, as the juices of the fruits named do not, when ripe, exhibit a green tint, it may perhaps be fairly inferred that the color originates from the *bloom* licked up or mixed by the bees with the saccharine juices they gather from the bruised or ruptured fruits.

H. H. K.

☞There are three German adages which run thus:

1.

Bees, sheep, and angle-rod, be sure,
Will make thee quickly rich—or poor!

2.

Sheep, doves, and bees, (nought surer,)
Will make thee nor richer nor poorer!

3.

Keep plenty of bees and sheep,
Then cosily lie down and sleep!

In the kingdom of Bavaria, over 200,000 hives of bees are kept, according to the official returns made to the government; and these, it is stated, yield an average annual profit of 75 per cent. on the investment. In view of this result, a late German writer thinks there is rather more truth in the last of these adages than in the first two.

The Italian Bee.

BY THE REV. GEORGE KLEINE.

No occurrence subsequent to the publication of Dzierzon's "*Theory and Practice of Bee Culture,*" has produced so great a sensation or elicited such general interest among beekeepers, as the introduction of the Italian bee into Germany. The stranger has been welcomed by one class, with the utmost enthusiasm, as an important acquisition; and regarded by another with distrust, because its ability to endure a more rigorous climate, was yet unascertained. Even now, opinions respecting its value differ so widely, that it is difficult for an inquirer who examines the various statements, to arrive at a satisfactory conclusion. It will therefore, probably, be gratifying to those to whom the whole subject is new, to have placed before them the results of the experience of various apiarians who have been engaged in the culture of this variety of the honey bee. I purpose doing this in the present and some subsequent articles, and shall endeavor to treat the subject with entire candor.

The so-called Italian bee has been cultivated from time immemorial in the northern portions of Italy, and some adjoining districts, and differs from the common honey-bee only by its peculiar color and markings. In the workers the first three upper segments of the abdomen are of a bright orange color, though the lower margin of the third segment is black. While young, this coloring is brighter, and becomes darker as they increase in age; but under all circumstances it remains sufficiently marked to enable the observer to distinguish the two kinds at a glance. Still more conspicuous is the difference between the Italian and the common queen. The Italian queen has not only the orange color segments in common with the workers, but the yellow predominates, also, in all the other segments. The drones differ from the common drones, in having the first three segments bordered with orange, and in having orange-colored spots besides.

Dzierzon, as he states, was "greatly surprised by the unusual appearance presented by the Italian bees, not having anticipated so marked a difference in color. Each worker, also, when gorged with honey, seemed to be swollen to the dimensions of a queen." All who see the Italian bee for the first time, are, like Dzierzon, agreeably surprised; so unusual and singular is their appearance.

Still, notwithstanding these striking peculiarities, the Italian bee is not a distinct race, but simply a variety of the common honey bee, corresponding with it in all respects, except color and markings. Many have, indeed, contended that they differ from the common kind in various points. But such is not the fact. The Baron of Berlepsch gives the following, as the result of his observations:

"It is nothing more than a differently colored variety of our well-known common *apis mellifica.* In this opinion I am supported by two of the highest authorities, Professors Von Siebold and Leukart. I am, indeed, curious to learn in what, besides color and marking, the least difference of physical structure can be found. Some say the Italian worker is larger, and others say it is smaller and more slender. Some say the Italian drones are larger than the common; and Heaven knows what specific differences they discover between the queens. Delusion all. Variations and differences, quite as great and striking, can be found among our common bees. Thus we frequently notice small drones, diminutive workers, and Liliputian queens—diversities resulting, as is well known, from the size of the cells in which these are respectively bred. And who has not observed how greatly the bees of common colonies differ in size, even in the same apiary! The Italian bee, as compared with the common kind, is not a different *species*, but merely a *variety* of the same species—a *race*, a *breed;* just as the Arabian and the Polish horses, the Durham and the Holstein cattle, are not different species, but varieties of the same species. As in these, the varieties, the races, the breeds, differ from each other, not only in physical conformation and color, but likewise in peculiar habits and properties; as the Arabian steed has more speed and bottom than the London cart-cob, and as the Ayrshire cow yields more and richer milk than the Tyrolese, so also are there differences between the Italian and the common bee—peculiarities of color, adaptations of habit, and manifestations of instinct, specially characteristic of each, and which give the one preferences in some respects over the other."

Dzierzon also distinctly recognizes this identity of species. Soon after receiving his original colony from Italy, he remarked:

"The size of the cells built by them, as well as of the bees themselves, is precisely the same as in the case of our common bees. The Italian bee would be of less value, and less interesting to us, if she were of a distinct species, sustaining to the common kind some such relation as subsists between the latter and the humble bee. But she is clearly of the same species, differing only in color and

some few other obvious particulars. Hence as the Italian and the German bees will peaceably unite in one colony, and the German bees will accept of an Italian queen, as the Italians will of a German; and as they will also mutually accept and cherish each other's brood, they furnish us with the means of making various interesting experiments and observations. The Italian bee is only our ordinary *apis mellifica*, distinguished by certain prominent characteristics peculiar to herself. If this were not so, it were idle to think of interchanging queens or brood, and useless to furnish them with empty comb, from our common stocks.—The two kinds do not differ in any essential particular, they will unite cordially in one community, and accept reciprocally combs and brood, royal cells and queens; though when thoroughly intermingled in the same hive, they may, during life, be as readily distinguished from each other, as white men from black."

As early as the time of Aristotle, the existence of the two races was known; and Virgil clearly describes the difference between them in the fourth book of his Georgics. Varro and Columella also mention them. And at this day both varieties are met with in various parts of Italy. Mr. Deus, of Dusseldorf, found the orange-colored bees at Genoa, and the black in Nizza. Spinola found both kinds in Piedmont, though the common bee was less frequent there than the pure Italian. The reddish or roseate bee, mentioned by Della Rocca, which is said to have been introduced into France from Belgium and Holland, is probably the Egyptian variety, described by Latreille as the *apis fasciata.*

Though the Italian bee was so long and extensively known, it escaped the notice of the German apiarians, who little anticipated how important she would prove to be for the settlement of controversies which had long been maintained among them. Capt. Baldenstein, of Cour, in the Grisons, first called attention to this bee in 1848, as peculiarly adapted to determine the question as to the origin of drone-eggs, and as furthermore of great value in practical bee culture. During his long sojourn in Italy, he had enjoyed ample opportunities to observe the habits of these bees, and subsequently introduced them into Switzerland. Though he did not succeed in multiplying pure stock, he obtained some important results, an account of which he communicated to the Bienenzeitung, and these attracted to it the attention of the intelligent correspondents of that periodical.

Dzierzon, who, in whatever tends to elucidate the theory or advance the practice of bee culture, is ever foremost, took the lead here, also. His fame as an apiarian had already extended beyond the Alps, and induced Madame de Prollius, of Mira, near Venice, to address some inquiries to him, in the autumn of 1852. When replying, he availed himself of the opportunity to request his fair correspondent to send him a hive of Italian bees, hoping thus to obtain what he so ardently desired to possess. His request was promptly complied with, and by the aid of the Central Bureau of Agriculture, at Vienna, the hive was transmitted from Mira, and reached him safely on the 19th of February, 1853.

Thus the means, long desired by the German apiarians, of definitely settling various disputed points, were happily placed in the hands of their most distinguished co-laborer, who was likewise eminently qualified to employ them properly.

But the first problem to be solved was, whether the Italian bees could be preserved pure in their new home. If this were not practicable, then the introduction of them would lead to no permanently valuable results, and well might it be held a matter of doubt at least, since Capt. Baldenstein had not succeeded in multiplying genuine stock, by any means he could devise. But Dzierzon did not despair, declaring that unless some special mishap should befall his colony, he felt confident of attaining his object, as he intended to adopt a process essentially different from that pursued by Capt. Baldenstein. The meeting of the General Apiarian Convention, at Vienna, in the ensuing autumn, was now looked forward to with great interest, as Dzierzon promised to report to it his success or failure, with an account of his observations meantime, and the results of the experiments he designed to make. When the Convention met, he stated that he had succeeded in rearing thirty Italian queens, fecundated by Italian drones, and consequently pure. Besides these he had twenty young Italian queens fecundated by common drones, and four common queens fecundated by Italian drones—which of course were mongrel brood. His eminent success after the failure of Capt. Baldenstein, was highly gratifying and encouraging; yet it did not remove all doubt respecting the perpetuation of the race in its purity in a foreign climate. It was possible that for a few generations it might remain essentially unchanged, and yet, in process of time, gradually so degenerate as not only to lose its more prominent characteristics, but also the other properties which gave it a superiority over common bees. Though Capt. Baldenstein stated that, after seven years' experience, he could perceive no tendency to degeneration from the influence of climate, pasturage, &c.; this was not regarded as conclusive,

because the effects of climate would be likely to manifest themselves only among the more remote descendants of the colony, though the brood continuously produced by the original queen, would exhibit no symptoms of change. The Baron of Berlepsch says:—"Almost every one to whom I showed the Italian bees in my apiary, inquired whether they would not degenerate in our cold and variable climate," and adds—"they should not have asked me, for I had addressed the same question to Dzierzon."

The subject engaged the anxious attention of Dzierzon, who subsequently adverted to it thus:—"Several apiarian friends who obtained Italian queens from me, conceive they have noticed that there is, in our climate, a tendency in the race to degenerate, because they occasionally observed workers and young queens emerge which are less beautifully marked than usual. The fact stated is undoubtedly correct, but the inference drawn from it is erroneous. The Italian race, properly managed, does not degenerate, but even admits of improvement. It evidently, in its purest state, contains a slight dash of common blood, introduced in the long course of ages; since no Chinese wall—not even the Alps—could effectually isolate the races and keep them from intermixing to some extent. Now, this fragmental dash of foreign blood, exhibits itself only in the occasional production of individuals, especially queens, not having the fulness and clearness of color which distinguishes the genuine breed. It can therefore the more easily be *bred out*, by a careful selection of stock. It is my practice always to select and reserve only the most perfectly marked queens and drones, believing that I shall thus in the course of time, obtain a considerably improved breed." The Baron of Berlepsch, adopted the same view of the case, and says:—"I shall constantly endeavor to preserve and breed from the finest, that is, the more brightly orange-colored drones, and incontinently destroy every queen that does not emerge full colored and thoroughly marked." Improvement may be difficult to accomplish, yet it is not impossible.

But that the Italian bee is of a constant race and fixed type, independent of climate, is evident from what Dzierzon says of it, after attentively observing it for four years.—"This race of bees," he says, "is still as beautiful, as industrious, and as docile, as it was in the first season. Nay, in several of my colonies, as the result of careful breeding, it is even handsomer; because all the workers have now precisely the same color and markings. The queens, are, for the most part also brighter colored than the one I procured from Italy, as I invariably use the brood of the handsomest and most fertile queens for multiplying." The experience likewise of all the other apiarians in Germany, who labored for the diffusion of the new variety, and bred stock with due care, corroborates Dzierzon's statement. But the most conclusive evidence is the perpetuation of the pure race in those countries where it has subsisted from time immemorial, side by side with the common bee—as in northern Italy, in Normandy and in Flanders.

A deterioration of the race could only result from so-called bastardizing. The term *bastard*, as applied to the progeny of common and Italian bees, is sadly inappropriate, and cannot justly be applied in this case, in the sense in which it is used, of the mongrel progeny of other animals. The expression, however, was unfortunately introduced by Capt. Baldenstein, and thus brought into general use. It may as well now be retained, for apiarians who, as Dzierzon remarks, restrict their speculations to bee culture exclusively, may be permitted to regard as important enough to convert for them, as it were, a race or variety into a distinct species, differences which the scientific naturalist looks upon as of no real significance.

But the variation or degeneration resulting from bastardizing, is attended with peculiar and perplexing phenomena. At Vienna, Dzierzon first called attention to the fact that the bastard queens produce a progeny which is half Italian, not in *kind*, but in *number*. Thus in both kinds of bastard colonies, with common as well as Italian queens, bees seemingly pure Italians are produced, side by side with others apparently common, whilst only a portion are clearly a mixed or mongrel breed. Then likewise it occasionally occurs that a pure Italian queen fecundated by a common drone, produces brood predominantly of the one variety or of the other; and in some instances, the earliest produced progeny will be colored, and subsequently all will be common bees. From these and similar phenomena, strange and contradictory conclusions were deduced. Thus Mr. Rothe reared some Italian queens, which must have been fecundated by common drones, as his Italian queen perished before she laid drone-eggs. Several of these queens, he alleges, produced in the fall and spring following, Italian workers exclusively, though not all of equal beauty. Thence he considered himself authorized to designate as delusive, Dzierzon's assumption that a queen is genuine, whose progeny consists of Italian bees exclusively, while one which produces indiscriminately common and Italian bees, must be regarded as bastardized. He was further led by his observations, to the erroneous conclu-

sion that fecundation by a common drone did not necessarily bastardize every queen reared from pure Italian brood.

The Baron of Berlepsch expresses himself with more clearness on this topic. "The Italian race as we now have it," says he, "is not *constant* in color, and German perseverance and ingenuity are needed, to bring out fully and fix permanently its proper characteristic markings. Nay, I might even venture to assert that the Italian bee is not yet a perfectly distinct and peculiar race, but requires to be made such by a course of careful breeding, by which the dash of common blood shall be separated and excluded. An original queen, bred and fecundated in Italy, produced occasionally less highly-colored workers, and queens of a darker yellow, nay, some scarcely distinguishable from the common kind. Such also was the case with some of mine. Queens emerged, brilliant as though formed of beaten gold; and others again nearly as black as ravens, darker than common queens usually are; but the greater number were of an intermediate cast. The bright yellow queens produced, if not at first, yet ultimately, Italian workers exclusively. If at first a few common workers emerged, still after three or four weeks, or at latest in the ensuing spring, Italian bees alone appeared. The dark queens almost invariably produced common workers only, the orange-colored were very rare, and a few had only a faint tinge of yellow. Those queens which, from their color, held an intermediate rank, generally produced yellow bees and common ones indiscriminately. Occasionally one which, in external appearance, approximated to the Italian markings, would produce, from the first, Italian bees exclusively. The dark and all the less brightly colored queens produced bastard brood, without exception, even in seasons when none but Italian drones were hatched. Whereas the brighter colored, fecundated in summer, when common drones abounded, sooner or later produced Italian workers only. Sometimes also splendid specimens of queens appeared whose eggs always produced pure Italian workers; and, what is of more importance, genuine Italian queens."

The cause of the phenomena referred to, is to be sought for in the fact that some of the queens were genuine and some bastard; and that in the latter, the common blood was predominant—in some to a greater, in others to a less extent.

Count Stosch had previously made similar observations, and came to the conclusion that *only those queens should be considered genuine, whose royal progeny produced none but Italian brood.* Dzierzon also gives it as the only reliable criterion of the genuineness of a queen, that her royal daughters, fecundated by an Italian drone, produce Italian workers exclusively. All good apiarians engaged in rearing Italian bees, now concur in this view, and thereon is based the only sure practical mode of perpetuating the pure race.

Thus the certain preservation of the Italian race in its purity, is certainly feasible, if the requisite arrangements and precautions be adopted and adhered to strictly and prerseveringly. Dzierzon says:—"Though an Italian colony with an unfecundated queen, stand amid hundreds of common stocks, our object will be attained if we suppress drone-breeding in the latter, and foster it to the utmost in the former." His own original Italian hive was placed among seventy hives of common bees, yet the majority of the Italian queens reared by him were fecundated by Italian drones. He managed to procure so large a supply of Italian drones as greatly to outnumber the others, by transferring the drone-combs filled with brood from his Italian stock to the common hives, and replacing them with empty drone-comb taken from these. Among other means of preventing degeneration, he recommends so arranging matters that the bees of hives containing unfecundated queens several days old, and those of others containing the most Italian drones, should be induced to fly simultaneously, either in some isolated location, or at a particular hour or season when common drones are not flying. This is not difficult to accomplish, as the Italian bees commence breeding much earlier in the year, and consequently are sooner provided with drones, than the common kind. Hence, if young Italian queens are reared as soon as drone larvæ can be found in Italian hives, intermixture will be almost certainly precluded, if the weather permit the queens and drones to fly before drones are hatched in common hives. The preservation of Italian drones to a period beyond that at which common drones are destroyed, may be effected by removing the queens from some of the Italian stocks which still have drones. By successive removals of the young queens reared by such colonies, the retention of the drones till late in the fall may be secured, for the fecundation of queens reared after the disappearance of the common drones.

The ill success of Capt. Baldenstein in his efforts to multiply Italian bees, is accounted for by Dzierzon, on the supposition that the original hives contained only a small quantity of drone-combs, and consequently produced proportionately few drones. If this had not been so, he

thinks the young Italian queens would certainly have been fecundated by Italian drones, as these bees swarm much earlier in the spring than our common kind.

RANGE OF BEES' FLIGHT.

The distance to which bees will fly in search of pasturage and to gather honey, has been the subject of much discussion and controversy. I regard it as depending so much on circumstances, that it is rather a matter for observation in each particular locality, than one to which any general rule can be applicable. I conceive it to be the province of each apiarian to study his own location, and to be governed by the circmmstances by which he finds himself surrounded. Seasons, climate, the character of the prevalent vegetation, the nature of the cultivated crops, their customary rotation, &c., must all be taken into consideration, as they exert a controlling influence on the resources which the bees can command. As these vary, so also must vary the abundance or scarcity of the pasturage resulting therefrom, and the range of the bees' flight in quest of their coveted treasures must necessarily be influenced and determined thereby.—When distant points present no superior attraction, the bees will certainly not fly far. But when the immediate vicinage withholds what more distant areas offer, their excursions take a wider range, and extend very far. These diversities vary with the varying season; are affected by the prevalent course of the wind; and are influenced by the kind of crop under cultivation. They are governed too by the situation of the locality in which bee culture is prosecuted. On an extensive level plain or prairie, of uniform climate and uniform vegetation, bees do not usually fly far; and there it does not unfrequently happen that they fail to secure the requisite supplies of honey; because, when the ordinary fountains of nectar are dried up, the failure is universal in the entire area to which they have access. In such case, the monotonous character of the vegetation all around necessarily renders failure and famine synonymous, so far as the bees are concerned. A fertile valley with its adjacent hills presents a more happy combination, and the bees' flight is less limited—extending sometimes to the distance of three or four miles. The earlier-blooming flowers in the bosom of the valley, and the later supplies furnished by the flora of the hillsides, give to bees there located a decided advantage. Short crops or failures are rare in such situations, because a succession of pasturage is offered to the busy gatherers, and provides them with constant employment from spring till fall. Unfavorable weather never cuts off their resources so entirely as to prevent them from providing adequate stores, even in the worst years. But it must not be forgotten that very distant sources of supply, such as are situated two or three miles from the apiary, are never of much account, however ample in themselves, as much time is lost in passing to and fro, and many perish on the journey. Hence it is customary, in many parts of Europe, for the beekeepers to perform a sort of Mahometan miracle in behalf of their cherished charge, and as the pasturage cannot come to the bees, they carry the bees to the pasturage—by transporting their hives thither. S. S.

BEES AND BOTANY.

Each species of the genus *Apis* appears to have some special classes of forage plants assigned to it for use, by the Creator. The blossom of the red clover and the flowers of bonervale (*Symphytum officinale*) abound in honey inaccessible to the common bee, but easily reached and appropriated by the humble-bee, which is, in its turn, unable to gather from the smaller kinds of flowers. The case is similar with the tobacco plant, the purple lamium, the dead nettle, etcetera, which have all been designated by botanists as honey plants. They are visited by the humble bees only, and not by the common bees. The same is the case likewise with the asters, the lupines, the vetches, the peas, and the beans.

Bees generally prefer gathering from the blossoms of one kind of trees or plants exclusively, when several kinds are simultaneously in blossom. Thus, all other flowers are forsaken for those of the lindens while these are in bloom; and those of the locust tree constitute a universal attraction, to the exclusion and neglect of all others. They will forsake their favorite rape, if buckwheat be in blossom at the same time. The crown imperial secretes honey abundantly at the base of the petals, yet I have never seen a bee gathering therefrom. Whether this be from an aversion to the odor of the plant, or some distasteful quality of its secretions, or because some other more attractive flowers blooming at the same time, invite and engage their labors, I have not yet been able to ascertain. A.

LONGEVITY OF THE QUEEN BEE.

Queen Bees usually die in their fourth year, though they have been known to live longer.—There is, therefore, very great advantage in hives which allow her, when she has passed the period of her greatest fertility, to be easily removed. See our article on Hives in this number.

MEXICAN AND OTHER BEES.

Various kinds of bees are found in Mexico, but they are either *melliponæ* or trigonæ, and not *apis mellifica*, such as are common in this country. A wild bee exists in the districts of Jalisco and Durango, which produces a well-flavored and ruby-colored honey, gathered exclusively from Cactus flowers. Another kind is found in Yucatan, which produces an abundance of yellow wax. In Venezuela and Guiana there is a species of bee called *apis amalthea*, which stores up in small waxen sacs or bags attached to the top branches of trees, a high-flavored, very liquid honey, requiring to be boiled down to a proper consistency before using. The wax, which is yielded very plentifully, is of a brownish-yellow color, and cannot be bleached.

There are also in Mexico, several kinds of stingless bees, which are favorite family pets in the districts where they occur. When the people find any of them in the forest, the tree is speedily felled, and that portion in which the bees harbor is cut off, carried home, and suspended against the front of the fortunate finder's dwelling. A peculiarity in the habits of these bees, is their mode of securing the honey they gather. They deposit it not in ordinary cells, but in sacs made of wax, which are of the size of a pullet's egg, and are attached by them to the inner sides and top of the hive or *gum*. In the spring and fall, the proprietor takes out these little sacs, and empties them into bottles or bladders. The honey is very pure and of an excellent quality.

The chief pasturage for bees in the neighborhood of Vera Cruz and Puebla, is supplied by the various species of Salora and Sygenesia, which there grow wild and bloom in what are with us, the winter months. At that season the dews are heavy, and as no rain falls then, the bees can labor with uninterrupted industry. The rainy season (in July,) is the most trying time for these insects, as there are few flowers in blossom then, and the nectar of those which do bloom is washed out by the frequent heavy showers. The bees then resort to the gardens and the sugar plantations, which latter prove fatal to multitudes that perish in the syrup vessels. In September the bees are generally subject to dysentery, which is, singularly enough, supposed to be caused by the blossoms of maize or Indian corn.—SARTORIUS.

Dr. Jähne says he has occaslonally noticed bees lick up the liquid extruded by the aphides, but more generally saw them pass it with evident unconcern.

The Persian Insect Powder has been successfully used to expel ants from hives and apiaries.

BEES NOT DECOYED.

It always seemed strange to me that bees were never found in the vials partially filled with sweetened water, which I suspended on my espaliers, to catch wasps and other insects. I examined more than twenty of such vials, very carefully, yet never detected a bee among the multitude of dead wasps, hornets and flies which they contained. I could account for their absence only by supposing that the wasps and flies are the first to discover these receptacles of alluring liquid; and when the bees arrive, the vials already contain a contingent of captured adventurers belonging to those tribes with which the more chary bee is not disposed to join company. The peculiar odor, also, emanating from the entrapped and perishing victims, though attractive to those of their own order, is probably repulsive to the bees, and deters them from entering the fatal vessel. H. H. K.

THE BEES AS MATHEMATICIANS.

Mr. Willich recently read to the British Association a communication on the above subject, which he illustrated with models admirably calculated to make the matter intelligible; and related a very interesting history of the speculations of mathematicians, in their successive attempts to discover the angle which gave the greatest strength with the greatest economy of materials. It proved that though some of the mathematicians had fallen into error, the bees, by a peculiar instinct, had always used mathematically correct angles.

MR. HOFFMAN, of Vienna, caused a very prolific queen bee to sting him, allowing her to withdraw her sting leisurely. He states that she laid no eggs thereafter, though she seemed to be in good health and vigorous during the five following weeks. He then killed and dissected her, but could not find any evidence that she had sustained internal injury. Probably some muscle connected with her oviduct was deranged by her exertions in withdrawing the sting.

☞ The earliest resources of the bee are *the willow*, *the osier*, *the poplar*, *the sycamore*, and *the plane*, all of which are very important adjuncts to the neighborhood of an apiary. The catkins of several of them afford an abundant supply of farina and attract the bees very strongly in early spring when the weather is fine. Mr. Kirby, in his *Monographia Apum Angliæ*, considers the *female* catkins of the different species of Salix as affording honey, the male ones, pollen.

To these may be added *the snowdrop*, *the crocus*, *white allyssum*, *laurustinus*, &c.

Dr. Barth's Method.

The following is the method of managing bees in common hives, whether of wood or straw, devised and recommended by Dr. Barth, Editor of the German Bienenzeitung, and practised by himself and others with satisfactory results. It is still extensively employed in districts where movable comb hives have not yet been introduced.

The beekeeper should select two healthy populous stocks, in hives having each a hole three inches square cut in the top and covered with a close fitting board or block. When the first hive, or No. 1, sends out a swarm, it is immediately to be removed to some other location in the apiary; and the hive containing the swarm must be set on the place it had occupied. Many of the old bees will, for several days after the removal, leave the parent hive and join the swarm, strengthening it, and divesting the old stock of all disposition to swarm a second time.

After the second or No. 2, of the selected stocks has also swarmed, it is immediately removed and placed on the top of No. 1, first taking away the block or board which closes the hole. The hive containing the swarm is then to be set where the parent hive stood.

If the two hives selected are of nearly the same size the supering can be effected with but little trouble. But if No. 2 is larger than No. 1, a half inch board of suitable dimensions and having a hole cut in it corresponding with that in the top of No. 1, and adjusted to it, must be interposed between the two hives. The entrance of the upper hive must now be carefully closed, constraining the bees to pass down through No. 1, in their way out. Many of the bees in No. 2 will forsake it during the next two or three days, rejoining and strengthening the swarm which issued from it.

The first removed of the old stocks should have a spoonful of water given to it daily, for about a week after it has been removed from its old stand.

The owner will thus have two populous young colonies, and a very strong stock from the union of the two old ones.

If the season be ordinarily favorable, the young colonies will soon fill their hives with comb, and store up honey enough to serve them for the ensuing winter. The united stock will also do well, having the brood of both to strengthen it, and a vigorous young queen.

On the day after the union has been made, nearly all the drones will be expelled from these parent hives, and the bees will begin to labor with great industry—displaying unwonted activity. The united stocks are to remain undisturbed till late in October. Then, by gently tapping on the sides of the hives, the owner can ascertain in which of them the bees have taken up their winter quarters—the loudest humming being heard in that which contains the queen and the mass of the workers.

If they are in the lower hive, the upper or No. 2, must be removed, and the hole in the top of the lower one closed. If they are in the upper, then the lower hive or No. 1, must be taken away, and the upper or No. 2, set on the bottom board, and its entrance reopened. The removed hive contains all the surplus honey, with very few bees, which will soon leave it, on puffing in a little smoke. The other hive will usually prove to be a fine standard stock, in good condition for wintering.

By this method a moderate annual increase of stock and a fair amount of honey is secured—which is as much as can ordinarily be expected in average honey districts, where bees are kept in common hives.

The novice in beekeeping should impress it on his mind, that a rapid multiplication of stock and large crops of honey in the same season, are incompatible results. He must constantly have regard to this fact, whatever description of hive he selects, or whatever method he adopts in his practice, or he will be liable to mortifying disappointment.

Mr. Demarees relates that, on the second of June, 1854, two strong first swarms issued from hives in his apiary, and united as they came forth. He hived them in a large double hive. They remained therein three days, few bees passing in or out meantime, and no comb was built. On the fourth day the entire mass sallied out again, in regular swarming style, and was hived anew. They were now content, went to work industriously and prospered. Both queens had probably been retained during the idle term.

An extensive traveller, Mr. Koppelhoff, remarks:—"On close observation everywhere among the peasantry of the countries I visited, I uniformly found that small cottagers, who kept bees, were in the enjoyment of a greater amount of the comforts and conveniences of domestic life, than those who paid no attention to that industrious insect."

To avert the injurious effects of dampness or condensed moisture in common wooden hives, in winter, Christ recommends removing the top or cover in September, substituting a straw mat for it, and then laying the top or cover thereon.

AMERICAN BEE JOURNAL.

Philadelphia, January, 1861.

TO CORRESPONDENTS.

All who are interested in the subject of Bee Culture, are respectfully requested to contribute to our columns. Communications to insure insertion, should be sent in by the first of the month at the latest, and as much earlier as possible.

Address them to A. M. SPANGLER & Co., Publishers, "AMERICAN BEE JOURNAL," No. 25 North Sixth Street, Philadelphia.

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TO EXCHANGES.

Will our Editorial brethren who receive this number of the "Bee Journal," do us the favor to notice its advent, and at the same time continue their exchanges with us? We shall take pleasure in reciprocating the favor in any way in our power.

DELAY.

This number of our "Journal" has not been issued as promptly as it should have been, from the fact that some delay was occasioned by a difficulty in procuring at the desired time, the type for printing it. That difficulty having been removed, we hope to have all future numbers ready on or before the first of the month.

"THE FARMER AND GARDENER."

As many persons to whom this number of the "AMERICAN BEE JOURNAL" will be sent, are interested in Agricultural and Horticultural pursuits, we would direct their attention to the "FARMER AND GARDENER," a first-class paper devoted specially to these subjects. This periodical has assumed a high position in the Agricultural world, and justly ranks with the first in size, appearance, and value of contents. We have stated elsewhere, that a copy of the "Bee Journal," a copy of the "Farmer and Gardener," and a copy of either the "Year Book of the Farm and Garden" or of "Both Sides of the Grape Question," will be sent for "*One Dollar and Fifty Cents.*" We are justified in asserting that no other publications in the United States of similar value, are furnished at as low rates. The Premium Books are handsome publications of high standard reputation, and have deservedly attracted great attention. Specimen copies of the "Farmer and Gardener" furnished gratis.

CLUBS!—Persons desirous of forming Clubs are referred to second page of cover, for terms.

Monthly Management.

JANUARY.

At the approach of cold weather, the bees gradually cease to labor and retire within their hives, and when winter has fully set in, we find them densely crowded between their combs, in a state of almost entire inaction, yet not really torpid. The queen has long ceased to lay eggs, and the last of the brood will generally have emerged before the close of the year. Closely packed together to maintain the requisite degree of warmth, and exceedingly abstemious in the use of those stores which their provident summer toil enabled them to lay up, they patiently await the return of milder weather. They seem to have a presentiment, an instinctive feeling, of the approach of spring; and long before reviving vegetation indicates its advent, unmistakable manifestations in the interior of the hive, show that the colony is conscious of the coming genial change. Not unfrequently the queen begins to lay eggs already in January, though this is by no means a desirable occurrence, resulting commonly in detriment to the colony and damage to its owner. Such precocious brooding involves a consumption of stores which may be needed for the support of the colony in the event of protracted unfavorable weather occurring subsequently, and which could be more advantageously employed for the same purpose at a later period. The presence of brood in the combs, imposes on the bees a necessity to occupy permanently that part of the hive in which those combs happen to be; at least they will very reluctantly abandon the brood-combs if a spell of severe cold supervene. They may hence perish of hunger, though there be an abundance of honey in other parts of their dwelling, to which they cannot readily have access while the cold weather continues, without exposing the brood to destruction. In common hives, the existing exigency, in such cases, can rarely be discovered in time to enable the owner to succor the suffering colony; and, though as a general rule, the bees should not be disturbed at this season, yet where movable frames are used, relief can be given when there is reason to suppose that the bees are in such unfortunate predicament. The hive may be opened and combs with sealed honey transferred from the sides and placed in close proximity to the cluster; or sticks of sugar candy may be pushed down among the bees between the combs, and their wants thus supplied. Such operations, however, should not be undertaken, unless there be cause to suspect that they are necessary; or when a mild day enables it to be done as a precautionary measure. Indeed, if such a day occur in mid-winter, the opportunity should be availed of, to examine especially the weaker stocks, and such as are not amply supplied with stores. Their wants may then be safely ascertained and easily provided for, so as to carry them successfully through the winter. Whatever supplies are given to them, should be placed in close proximity to the cluster or immediately above it, that they may be readily accessible in any state of the weather.

Besides a sufficiency of stores, adequate warmth is indispensable for the wintering of bees. Straw hives are ordinarily warm enough; but box hives, made of thin boards, need some additional protection if wintered on their summer stands, in the open air. A piece of old carpeting, placed on and around them, leaving the entrance free will generally suffice. Movable comb hives, as commonly made, are sufficiently warm; but they need and should have just sufficient upward ventilation to prevent the condensation of moisture, against the interior of the sides. More than this might cause a deficiency of moisture, and the bees would suffer for want of water.

Mice are prone to enter hives in winter, if the entrances are large enough to enable them to do so; these should, therefore, be diminished so as to allow only one or two bees to pass at a time. Cats likewise are an annoyance, to which bees should not be exposed. They should not be permitted to run upon or gambol between the hives. Nor should the direct rays of the sun be allowed to strike the entrances during the winter, when the bees ought to enjoy undisturbed repose. A slight temporary screen, easily removed on mild days, when the temperature permits the bees to fly, will prove highly serviceable—preserving the bees and preventing an inordinate consumption of honey. If a warm day tempt the bees to fly while the ground is covered with snow, a quantity of loose straw should be scattered on it in front of the hives to keep the bees from being blinded by the glare, and aid them in regaining their homes. If, in addition to this, the apiarian has taken the precaution to secure his hives from being stolen, he will have done all that can properly be required of him, during this month.

☞ When robbing-bees attack a weak colony having a fertile queen, it is advisable to remove it from its stand to a dark chamber or cellar. Set an empty hive in its place, strew therein a handful or two of the stems and leaves of wormwood, and rub the front of the hive and the bottom board therewith. The assailants will soon forsake the spot, and the colony may be replaced on its stand on the evening of the following day.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. II.

The first proposition which we are now to consider, is in the following words:

1. A colony of bees in its normal condition, consists of three characteristically different kinds of individuals—the queens, the workers and (at certain periods) the drones.

All this will be readily conceded. But there are some apiarians who contend that there is, in every colony, a fourth kind—the *black bees*, quite as distinct as any of the others, and to which they ascribe the function of laying the drone-eggs. This seems plausible, too, for it is an undeniable fact that bees do occur which are distinguished from the rest by their darker color; and the question can only be whether the blackness of those bees is an accidental trait or constitutes a characteristic difference. Dr. Magerstedt contends that the color is constitutional, and enumerates besides not less than twelve other points of difference between these black bees and common workers. Thus, among other things, he alleges that these bees are black when they emerge from the brood-cells; that their proboscis is much shorter; that they have no corbicula on their thighs; that they have a smaller sting, and possess ovaries. It is hard to contend against facts, if these be facts—which I cannot concede. Among the many thousands of young bees which I have seen emerge from the brood-cells, I never saw one come forth of any other color than a lightish-grey. All the black bees I have ever observed in my apiary have probosces as long as others, corbicula as deep, and stings as large. As regards the existence of ovaries, I cannot venture to decide, as I have neither the talents nor the instruments requisite for so delicate an investigation. In the interest of science, however, I will cheerfully pay the expense of an examination by some competent physiologist, provided his report be illustrated by drawings on a scale sufficiently large to show the eggs in the ovaries, and render obvious to all, the difference, if any, in the probosces, stings and corbicula. I would further suggest that before comparison is instituted, the specimens of common workers selected be deprived of their hirsuties, or at least thoroughly wetted. Possibly if this were done with an entire colony, the operator might discover that he has before him black bees exclusively—precisely similar in all respects to those which have been termed *drone-mothers!* I am not disposed to be jocular, but there cannot be a doubt that all the allegations of Dr. Magerstedt to which I have referred, rest on sheer delusion. Excepting the variation in color, and the greater or less absence of hair, there is no physical difference whatever between the common and the black bees. The unprejudiced use of one's eyes, is sufficient to settle this point conclusively.

But in what way do these bees lose their hair? Or, rather, how do they become black? Is it the result of age, or of toil? Not precisely. Toil-worn veterans are easily known by their dark-brown color, and lacerated wings, whilst these are of a glossy-soot color, sometimes even coal-black, and have generally uninjured wings. The *former* are the kind which may be found in large numbers, almost every summer, when there are abundant and long-continued supplies of pasturage. They are the oldest among the workers; those which have labored longest and most industriously, on the blossoms of such plants as the centaurea, euphorbia, &c., and whose coats, as Mr. Frank graphically expressed it, have become *seedy* or

"shabby genteel" in the service. The *latter* kind, the glossy-sooty black, appear early in the spring, not indeed in every colony, nor in large numbers, but singly, here and there, and have all disappeared before autumn. Yet catch one of these, scrutinize it with the utmost care, and you will find you have—nothing but a common worker.

I have often compared with each other these two differently shaded black bees, and have always found that the prime color of the latter was a sooty or glossy-black, while that of the former was a brownish-black. This was the case still when the latter was more completely deprived of its hirsuties than the former. This led me to conjecture that the glossy-sooty color did not result from the loss of hair; but that some other influences had operated on the corneous tunics of those bees.

The common opinion is that the darker color of these bees results from their having been besmeared with honey; and that they are those precisely, which have been most frequently and longest engaged in robbing other colonies of their stores. To test this, I made the following experiment:—I set before a populous colony, in which I could not discover a single black bee, a plate of honey, and when it was densely covered with bees, I poured honey on them, and left them till they had been licked clean by their companions. I repeated this on four successive evenings, and finding that not one sooty-black bee was to be found amongst them after the operation, I concluded that this peculiar color was not produced in the manner supposed. Nor could I find that it resulted from creeping through crannies and crevices, nor from occasional combats with bees into whose hives they attempted to intrude. Careful investigation satisfied me that nothing of this kind could produce the effect.

Finally, an accident, or rather a mishap, led to the discovery of the cause, and convinced me that Mr. Südz had, as early as December, 1848, substantially surmised the truth.

In April, 1852, I exhibited my glass hives to a friend then visiting me, who was so delighted therewith, that he expressed a strong desire to obtain one. I promised to gratify him, but as the combs in mine were already much discolored, I proposed to stock a new hive for him, with a swarm, at the proper season. A hive was immediately procured, and on the 19th of May, I introduced in it an unusually large swarm. The bees had nearly all entered, when a servant came to announce the arrival of company. To receive them, I left the work unfinished, and could not return for nearly two hours. When I got back, I found the exterior of the hive densely covered with bees, and at once conjectured that another swarm had lit on it. The crowd had literally choked up the entrance, and from the great heat in the hive, and the want of air, fully two-thirds of the bees were suffocated, and all were dripping with perspiration. As a sufficient number to form a colony still survived, and I did not find the queen among the dead, I set matters in order and placed the hive in my apiary. Next morning I was greatly astonished to see hundreds of glossy soot-black bees, issuing from and entering this hive. For more convenient observation I transferred the colony next day to a more suitable hive, and soon satisfied myself that these black bees were Matuschka's and Magerstedt's famous *drone-mothers*—precisely similar in all respects to samples which I had seen on various occasions.

1. Their ocellæ seemed more prominent, their bodies thinner and slenderer, their corbicula smaller and shallower—all because they had no hair.

2. The head seemed further and more distinctly separated from the thorax, and this again from the abdomen—because from the absence of hirsuties, the insections were simply more obvious.

3. They appeared generally to be more supple and active than common workers, because from their nudity the movements of the limbs were more perceptible.

4. Many of them appeared to *drag* their abdomen along, as though their muscular power were somewhat impaired.

5. They carried in no pollen, or at most only mere rudimentary pellets; because these could not be securely retained in the corbicula denuded of their bristly fringe.

6. They showed no disposition, even in the pleasantest part of the day, when pasturage abounded, to rifle the flowers of their sweets. Hardly one in twenty which I examined had its honey-bag filled, and then not with the nectar of flowers, but with pure honey. It is evident from this that robbing is their perilous pursuit, and that they no longer possess a predilection for gathering the nectar of flowers.

7. On every hand they endeavored to force their way into other colonies, because in accordance with their natural instinct they desired to appropriate honey, and the change which their physical structure had undergone, disabled them to gather from flowers. When other bees attempted to seize them, they shrunk away timidly, or fawningly presented their probosces, as all robbing-bees are prone to do under such circumstances.

8. When hovering about a hive, doubtful of

their reception, they hold their hinder legs suspended downward and rearward, as other robbing-bees do in similar circumstances—thus showing that they are consciously strangers.

9. Occasionally they succeeded in effecting an entrance; but generally they were seized and killed, or crippled, as such intruders usually are.

10. Observing on one occasion a considerable number of them entering a hive together, I watched for their return, caught several of them, and satisfied myself by an inspection of their well-gorged honey-bags, that their object was to steal the garnered stores.

11. Their numbers decreased gradually, and by the middle of August, they had altogether disappeared.

Now is not all this just the same as with the glossy-black bees noticed in so many different districts, and about which some bee books make so much ado? And is it not thus demonstrated that their loss of hair and their glossy-black color are ordinarily the effects of fright, perspiration and exposure to a hot and humid atmosphere? I say *ordinarily*, because I would not assert that other causes may not, at times, produce similar effects; though I much doubt whether merely wetting the bees thoroughly would work such a change of color and appearance. Often as, in the course of my experiments with bees, I had occasion to immerse entire colonies, not unfrequently keeping them wet for hours, when searching for the queen or picking out the drones, I never saw that the bees changed color in consequence. I have often, also, noticed bees returning to their hives after a shower of rain, in which they had been thoroughly drenched, but never perceived that the number of black bees was thereby increased.

The foregoing remarks will serve to elucidate several other points:

1. The black bees usually make their appearance in early spring, because during the winter the animal exhalations in the hive are strongest, most confined, and most penetrating. Some of the bees remaining quiet and almost motionless for a considerable period, are consequently the more thoroughly exposed to the effects of these exhalations.

2. They disappear in the fall, because during the summer the causes producing them, such as the one mentioned above, are comparatively inoperative, the bees being less confined to their hive. Those which were observed in the spring have either died from old age, or were destroyed, like the drones, as useless members of the community.

3. These black bees are not apt to sting, because they are usually encountered at other hives than those to which they belong; and being consciously trespassers and robbers, they are timid and will not attempt to sting, but eagerly seek to escape—"Conscience making cowards of them all."

4. Their sting is not particularly painful, because they do not, like other bees, edulcorate the nectar of flowers in their stomachs, and hence probably secrete a less virulent poison. Is there not, moreover, in this respect, a remarkable difference in the effect of stings in general? Is a sting as painful in early spring as it is when the lindens are in blossom? These are questions not easily answered. Some persons also are so organized consfitutionally, or have in time become so habituated to the poison, that in them the sting of a bee does not at any time, or under any circumstances cause pain or swelling. Others are so accustomed to suppress their feelings, that, in all ordinary cases, they "grin and bear" such inflictions without wincing. Others again are so exceedingly sensitive, that a sting produces frightful swelling and dangerous illness. Who then can say that the sting of one bee is more, or less, painful than that of another?

5. At the time of the general drone-slaughter, as well as at other times in summer, dead black bees are occasionally found in front of the hives. These *may*, indeed, be common black bees, which have died a natural death, or have been massacred and cast out. But they may also be common workers which turned black in the agonies of death, if they were killed by suffocation—which is the usual process. Let any one examine a suffocated queen, and see if in every instance she be not found of a glossy-black color, with but a faint trace of yellow; and that workers also are, at times, subjected to the same species of capital punishment, is too well known to require proof.

6. They usually disappear at the general expulsion of the drones, because at that period all useless members of the community are banished. It is, however, not correct to say that they are expelled *en masse*, simultaneously with the drones; though till recently I was myself of that opinion. At this period many are cast out, and an unusual number of dead black bees are observed, and it thus came to be inferred that they are expelled or killed in the same manner, and as regularly as the drones. On the whole, more died from superannuation than from any other cause.

Having thus disposed of the case of the *black bees*, which is the only one ever seriously relied on as contravening the first proposition of the Dzierzon theory, we shall, in our next number, proceed to the consideration of the second proposition.

Workers not Monsters.

In an essay on "PHYSIOGRAPY, *in its application to Grape culture*," recently published, occurs the following passage:

"Great men, as well as common folks, sometimes make great mistakes. Huber asserted that the neuter or working-bee, was nothing more nor less than 'an imperfect female.' That is mere conjecture, and will not answer in this matter-of-fact age. God never made whole races of his creatures mere abortions. He permits monstrosities occasionally, but never made so gross a mistake in the organism of an entire class."

Cherishing, for *auld lang syne*, a high personal regard for the writer, who, we feel assured, would not consciously make a misstatement, we regret the more to be constrained to say that, in the passage just quoted, he does Huber injustice. He ascribes to him views not entertained and sentiments never expressed, by that intelligent and indefatigable, though blind, old naturalist, whose lot it has been to be largely misapprehended and extensively misrepresented, by those even for whose benefit he labored.

In the "*New Observations on Bees*," Huber says: "The discovery of fertile workers, made by Riem and confirmed by my own investigations, led me to conjecture that the entire class of workers pertained to the female sex. Nature makes no sudden leaps. The fertile workers lay drone-eggs only, like those queens whose fecundation has been unduly delayed. One step farther and they might be altogether sterile, without being the less feminine essentially. *I do not regard the workers as* ABORTIONS *or* IMPERFECT CREATURES. They are endowed with too many noble faculties, too much unwearied industry and activity, and from their instincts spring too many marvels to *permit me to consider them as* ABNORMITIES of their kind, or *as imperfect beings* in comparison with the queens. I believe that a rational philosophy will yet be able to reconcile all these difficulties."

This differs widely from the views attributed to him, and shows that with his mental eye he looked confidently to further discoveries, like those since made, whereby the mystery which in his day still enveloped the subject, would be elucidated, and the difficulties explained. He regarded the workers simply as physically undeveloped females, such as dissection and microscopic examination, subsequently demonstrated them to be; and saw clearly that such a condition was not incompatible with their position in the economy of the hive.

It is doubtless true that, if regard be had only to mere *animal* qualities, the queen is, *in that direction* more fully developed than the worker; and thereby becomes qualified to discharge properly her peculiar functions—*the perpetuation of the race.* This, however, does not constitute her a more perfect insect, absolutely, than the worker. The latter is quite as admirably adapted for her appropriate duties, and is, therefore, as regards the purpose and end of *her* being, as perfectly organized and as fully developed as the former. Both certainly proceed from the same kind of egg. That is a fact no longer to be controverted or doubted. Development proceeds in each in-like manner, and in the same direction, from the hatching of the egg *up to a certain point.* Thence, owing to the circumstances in which each is placed and the influences to which it is subjected, development diverges and tends to different issues. In the queen it culminates *corporeally*, in the maturation of animal functions and procreative power. In the worker, it is made to take a different direction. The growth of physical organism is repressed indeed; but instead thereof, her physical qualities, or what might be termed her mental faculties, are extraordinarily unfolded and intensified. Hence, if manifestation of mind, however subordinate in grade or qualified in character, be entitled to higher consideration and regard than mere corporeal qualities or physical organization, the worker might claim a more elevated rank in the sphere of development than the queen, whose physical endowments are certainly of a lower order, and limited to a narrower range. Each, however, is perfect, as regards herself, her assigned relations, and the purpose and design of her existence.

It is precisely this undeveloped femininity of the workers, and the bringing out, instead, of other and higher faculties, which qualifies them for the functions devolved on them by the Creator—that of foster-mothers and protectors of the brood, and providers for the subsistence and *preservation of the family.* Whereas the sexually more fully developed inmates of the hive—the queen and the drones—physically less endowed, are designed and serve for the *perpetuation of the race.* Each kind has its proper sphere, each its appropriate duties assigned to it; and, by its organization and instincts, each is specially and fully qualified to discharge these duties. The proclivities, qualifications and habits of each are, in the main, as distinct and characteristically different from those of the others, as if each belonged to an entirely different class of insects. Yet the three kinds are so yoked together—so interwoven in action, so fitted for each other, so dependent on each other, and so complementary to each other, that neither could permanently exist without the co-existence—at certain seasons at least—of both the others.

☞Are bees cold-blooded or warm-blooded creatures?

ORIGIN AND NATURE OF HONEY DEW.

In the annual report, for 1855-6, of the Royal Agricultural and Industrial School, of Landau, in the Palatinate, Mr. Th. Gumbel communicates the following results of investigations made by him respecting the origin and nature of honey dew.

1. Honey dew always makes its appearance when particular species of plants have developed their blossoms.

2. The ripe pollen-dust falls not only on the stigma of the blossom, but is generally in large part scattered on the leaves and other succulent portions of the plant, as well as on those of neighboring plants.

3. If the pollen-dust thus scattered becomes exposed to dew, it will rapidly produce a *carposma.* This term designates a peculiar vegetation of the pollen-grains, in consequence whereof, from a portion of them, which were already contained in various forms and sizes in the anthers, a gummy-granular substance exudes. Others produce so-called pollen-tubes; and others again generate within themselves, mature and extrude, still more diminutive grains. What the original pollen-grains thus undergo in this three-fold manna, is in turn undergone by the young brood also. The ultimate result is a mixt mass of pollen-grains and of successive generations of brood cells, which finally decompose and disappear as cellules resembling yeast cells or mould sporules.

4. If this carposma be brought under influences more than simply propitious to its development, a luxuriant growth is superinduced; and the cellules, instead of undergoing decomposition, are converted into so-called mycellium filaments, and are then capable of originating fungous organisms.

5. When the carposma has been formed in a globule of dew, it fixes and retains by its vegetative power, the humid atmospheric depositions; and we have the phenomenon of honey dew in the proper sense of the word, as a clammy substance dropping from leaf to leaf.

6. Honey dew as found on the leaves of plants, is precisely similar to the nectar of flowers, which, as in the cup-shaped sepals of the Linden, does not exist already when the blossom expands, but is produced only after the pollen-dust has fallen into them and been changed to carposma.

7. In the honey gathered by the bees, the carposma producing it—that is, the pollen-grains of those species of plants from which it was gathered—may readily be traced.

8. Honey dew proper is not the product of aphides, which have commonly been supposed to secrete and extrude it as a saccharine matter, covering therewith the foliage of plants and trees.

9. Neither is honey dew a consequence of the rupture of superficial leaf cells, permitting the extrusion of saccharine juices, which are alleged to issue at times with such force as to bespatter the walls of conservatories. Experiments made with pollen-grains on glass plates, have resulted in the formation of carposma. The occurrence of honey dew on walls, may hence be accounted for, without attributing it to the violent disruption of leaf cells.

10. If rain immediately follow the occurrence of honey dew, it will be washed off and the leaves remain healthy.

11. But if honey dew dry on the leaves and thus become fixed, the carposma may justify its name and superinduce a premature ripening of the leaves; which then become discolored with dark spots, and drop off soon after the blossom withers. This happened in this region, last summer, to the Lombardy poplar, which was thus nearly denuded early in July, though the black poplar remained in full foliage. Thus likewise the peach, plum and cherry trees exhibited diseased foliage last spring, and the nut trees lost their leaves soon after blossoming.

12. The functional efficacy of the pollen-grains is not confined solely and exclusively to the stigma of the germen. The great abundance of the pollen is of itself an indication that its influence extends also to other organs of the flower, and thus to the peripheral portions of the fruit.

13. The functional efficacy of the pollen-grains is not brief and transitory, but frequently of very protracted duration. Many blossoms, after having expanded, close again, thereby retaining and confining a large portion of the pollen-grains undispersed; just as though a kind of digestion or maturation thereof were designed or required for the more complete development of the pericarp. Thus the pollen and its carposma may be traced not only in the ripe fruit of plants which have the calyx-tube adherent to the ovary, such as the currant, gooseberry, apple, pear, &c., but likewise in those which have the germen nude, as in and on ripe cherries, grapes, &c.

14. If this carposma, thus normally retaining its efficacy for a protracted period, and thereby hastening the ripening of fruit, becomes exposed to the influence of a foggy atmosphere, so that its short-jointed filamentous tissue be transformed into mycelium, diseased organisms result, such as the grape fungus, *Oidium Tuckeri;* or the cells of the organ affected by carposma, and thus overstimulated to premature ripeness, develop as a pseudo-organism, tending to internal decomposition, such as the potato disease, *Botrytis infestans.*

15. According to proposition 13, the carposma of the pollen-grains may be traced even in the must of grapes, apples, pears, currants, cherries, &c.; and it is probable that ripe barley, even when converted into malt, still retains the carposma from the period of blossoming.

16. The striking resemblance between the ultimate brood cells of carposma and yeast cells, not merely warranted the conjecture that the carposma contained in the must of fruits, furnishes the primary elements of a ferment; but actual experiment has shown that the carposma of the Linden blossom, when introduced into a solution of sugar candy, speedily superinduced fermentation.

17. The rapid formation of honey dew is intimately connected with the rapid production of yeast cells. In the former case, sugar is produced; in the latter, sugar is decomposed.

SIZE OF COLONIES.

1. On the 16th of June, 1855, I prepared two hives, by inserting in each a set of sixteen frames furnished with guide comb. Both sets were of exactly the same weight, and were arranged in two tiers, in the same manner in each hive. I then introduced in the one a swarm of bees weighing six pounds, and in the other a swarm weighing three pounds, and gave them queens which, judging by the hives they were taken from, were equally fertile. On the 8th of October following, when all the brood had emerged in each, I took out the frames, and brushing off the bees carefully, weighed each set separately. On deducting the weight of the frames and guide combs, I found that the combs built and filled by the six-pound colony weighed 40 lbs. 6½ oz., and those built by the three-pound colony weighed 17 lbs. The product, in combs and honey, of the larger colony was thus ascertained to be 6 lbs. 6½ oz., more than twice the product of the smaller colony; and this excess was the result, exclusively, of the greater *working force* which that colony had from the start. This experiment shows that three pounds of bees are insufficient to enable a colony to labor advantageously.

2. I repeated the experiment in the same manner in 1856, excepting that I gave the weaker colony four pounds of bees. The season was unfavorable, and on the 15th of October, the stronger colony had produced only 19 lbs. 2 oz. of combs and honey, and the small 10 lbs. 9 oz. Hence the stronger had produced, proportionally, only 3 lbs. 4½ oz. more than the weaker.

3. Simultaneously with this second experiment, I fitted up another hive in like manner, and introduced in it a swarm weighing five pounds.—Weighing the product of this colony at the same time in October, it proved to be 15 lbs. 15 oz. I judged hence that six pounds of bees was probably about the weight which a swarm or colony should have when hived.

4. In 1857, which was an unusually good honey year in my neighborhood, I again repeated these experiments, giving the stronger colony seven pounds of bees, and the weaker six pounds. The result, as ascertained in October, when all the brood had emerged, was that the stronger colony had produced 50 lbs., and the weaker 50 lbs. 11 oz.

These experiments are certainly not to be regarded as furnishing a rule applicable under all circumstances and in all localities. But they show that in a comparatively poor honey district, such as mine is, a swarm should contain about six pounds of bees in order to be able to labor to most advantage. Some important particulars also require to be taken into consideration, when bees are to be weighed. Those with which I experimented were taken from clusters hanging outside of their respective hives, and may be supposed to have had comparatively little honey in their stomachs. One hundred and seventy-seven of them weighed half an ounce—being at the rate of five thousand to the pound. When about to swarm, bees naturally or instinctively gorge themselves with honey; and at such times one hundred and twenty-five would probably weigh half an ounce, or four thousand to the pound.—Berlepsch.

EGGS OF THE BEE MOTH.

The eggs of the bee moth are entirely round and very small, being only about the ⅛ of a line in diameter. In the oviducts they are ranged together somewhat in the form of a rosary. They are not developed successively like those of the queen bee, but are found fully formed in the ducts, a few days after the moth emerges from her cocoon. The female deposits them in small parcels or clusters on the combs. If any one desires to witness the discharge of eggs, he need only seize by the head a female two or three days old, holding it between his finger and thumb. She will instantly protrude her ovipositor, and the eggs may be seen passing along the semi-transparent duct.

That the moth does not deposit her eggs in the pollen of flowers, as some imagine, but on the combs in the hive, is very certain. I have repeatedly found little clusters of eggs on combs which I removed out of hives.—Dr. Dönhoff.

Early Spring Treatment,

IN POORER DISTRICTS.

Theoretical bee culture is precise, definite, uniform, consistent, and uncompromising. *Practical* bee culture, on the other hand, must be regulated or modified by circumstances. It is hence, pliant and accommodating; adapts itself to the particular location and surroundings of the beekeeper, and varies its plans and processes accordingly. The system which is advantageous and suitable in one section of a country, may be largely inapplicable and decidedly disadvantageous in another, though all the while the fundamental theory remains unchanged and unchangeable. My present purpose is not to discuss the theory, but to suggest modes of practice such as may prove generally serviceable in almost any locality. And as I design my remarks more particularly for the benefit of *beginners*, I propose to keep *their* wants steadily in view. Experienced beekeepers will please bear this in mind, should they do me the honor to peruse these articles, and fancy that there is too much of detail on some points, too much brevity on others, or that some topics have been altogether omitted. Let them kindly remember my special object; and if I occasionally adduce facts without submitting the proof, let them consider, that for the present, I assume that beginners will repose confidence in my fairness. Submitting all my statements to free discussion, I may, hereafter, if necessary, either demonstrate their truth, or retract whatever is found to be erroneous.

I proceed to treat of the management of bees from the close of winter to the end of April:

1. IN COMMON HIVES.

If, as should invariably be done, only populous and well-provisioned colonies have been selected for wintering, and these have been properly sheltered during the cold weather, and kept undisturbed, without being deprived of adequate supplies of pure air, the bees will come forth healthy and active, on mild days at the approach of spring. Their owner can rely confidently on the hardiness of the insect, and has no reason to apprehend an untoward result, except the occasional loss of a queen, if his hives contain such as are old or feeble. I shall, on a future occasion, discuss fully the important subject of wintering bees, and will merely remark that I pre-suppose that every beekeeper winters his stocks in a dark chamber or vault; or if he allows them to remain on their summer stands, he protects them, by screens, from the rays of the sun. Nothing is more injurious than to expose them to the sun's action during the winter months.

As soon after the middle of February as the thermometer, on a bright, calm day, marks 46° Fah. in the shade, remove the screens, or bring out the hives from their winter depository, and allow them to fly. By prolonged confinement their intestines have become surcharged with fœcal matter, and if prevented from flying on the first suitable occasion, they may be constrained to discharge it in the hive, soiling alike themselves and their combs, besides diffusing an offensive odor which may cause disease. Still it is needless to be over anxious about the matter, since it is ascertained that, if kept undisturbed, they can bear four months' confinement without inconvenience. If they were placed in a vault or dark chamber, Dzierzon recommends replacing them there in the evening, because at this early period they are still unable to gather supplies, and large numbers would perish in their excursions in quest of water and pollen. I shall not absolutely reject this counsel, but merely state that I do not myself follow it. I would not deprive myself of the pleasure of hearing the joyful hum of my bees and witnessing their activity in gathering pollen, though the loss were even greater than I ever found it to be. Many bees will still be lost on the cold days in April—nay, I fancy that ten-fold as many perish during the variable weather of that month, when the temptations to venture forth are so much more frequent. On the cold and stormy days in March the bees remain more contentedly at home than they do in April, when, if pasturage occur, they will hurry forth to appropriate it, though thousands drop chilled should the sun be suddenly obscured by clouds. I have known hundreds, laden with pollen, drop and die in front of my apiary, even in May, when a sudden change of temperature took place. The careful apiarian will always gather the chilled bees, and when revived, add them to his weaker stocks, by which they will be kindly received, if they were first slightly sprinkled with diluted honey. The greater number will probably afterwards return to their own hives; but some will remain, and weak stocks may thus be materially strengthened.

If the stocks were wintered in a special depository, each should, on bringing them out, be placed in its former location on the summer stand. They do not, in the course of four months, totally forget where their homestead stood; and by an inadvertent transposition, some may become greatly weakened and others unduly strengthened. Advantage may, however, be taken of this opportunity to reinforce weak colonies, by interchanging them

with such as can spare a portion of their population. Bees rarely attack each other on such occasions at this season; but if they become quarrelsome, a few whiffs of smoke will soon pacify them.

It is advantageous to change the bottom boards as soon as the weather becomes moderate, and *before the bees begin to fly*—removing all dead bees and other droppings collected there during their confinement. This will save them much labor, and preserve many bees; for they manage the business of carrying out their dead rather awkwardly, being apt to fall with them on the snow or cold ground, and there becoming chilled. In cleansing the bottom boards, it is best to begin at one end of a row of hives, giving the first a new board, and after cleansing the one removed, substituting it for that of the second, and so on. The operation should be performed as expeditiously as possible, and without noise; and it is, therefore, well to have an assistant to lift the hives gently as the boards are changed. If the hives stand so far apart that a bottom board may be set between them, the hive to be operated on should be quietly lifted and at once placed on the board intended for it. This involves less labor, and the bees are less disturbed, as the hive with its new board may be quickly replaced on its former stand. Expedition in this work is the more important, for if once the bees begin to fly it becomes difficult to transfer the hives without crushing many. If the hives have remained on their summer stand, the bottom board should be changed before the screens are removed; and if they were kept in a depository the change may be made just before bringing them out, unless they were set inverted during the winter. The bees are apt to become aroused while the hives are carried out, and crowd down on the bottom boards, especially in populous colonies.

After the bees have ceased to fly, on the afternoon of the day they were brought out, each hive should be closely observed, to see whether any of them show symptoms of queenlessness. If any colony continues to be restless or in commotion till evening; if after the day's labor is ended, the bees still issue in numbers, and run confusedly over the front and sides, as if in anxious search of something; if they fly off and quickly return again, issuing and entering in eager haste, there is every reason to conclude that such hive has lost its queen. And if within the hive a peculiar melancholy, occasionally intermitted wailing hum is heard among the workers, their destitute condition is conclusively announced. There is an unmistakeable difference between these sounds and those emanating from a colony possessing a queen, though it is difficult to give a beginner an intelligible description of the wail. A correct knowledge of it can only be derived from hearing it; and once heard it is not likely ever to be forgotten. While I kept bees in common hives, I used in the evening of the day on which the bees made their first or purifying flight, tap gently on each hive with my finger, placing my ear against the side at the same time. Those colonies which responded promptly, and briskly, with a general hum, at once relapsing into silence, were passed as in good order; while those which uttered a languid, plaintive tone, were marked as probably queenless, and in nine cases out of ten they proved to be so. Even colonies containing barren or drone-producing queens, will sometimes utter these plaintive sounds; and those having queens entirely sterile will do so pretty uniformly; not indeed on the day of their purifying flight, but usually on the first mild day thereafter, when the weather permits the workers to fly out and gather pollen. On such occasions, colonies having sterile queens will deport themselves just like those which are queenless. I attribute this to the newly-awakened desire for brood, which the workers then feel; and in the case of drone-producing queens, though the plaintive tones are less uniformly heard, the workers appear to have become conscious that the brood they are nursing is not of the kind required for the prosperity of the colony. Those who use straw or box hives, will do well to test their stocks in the manner mentioned, on the evening of some mild day after the cleansing, when the bees are able to fly.

While still using common hives, I found it advantageous, when the colony was populous, to have two entrances during the winter—one at the bottom and another higher up, near the middle of the front. I adopted this plan on finding that strong colonies are rather inadequately supplied with pure air, when the hive has an entrance at the base only. (In movable comb hives, the case is different. These should never have more than one entrance, because in them the influx of pure air, during winter, may be otherwise secured.) In the spring, however, only one entrance should remain open, and that must be at the base. In weak colonies, the entrance should be kept small, to prevent the attacks of robbing-bees, and to retain the internal heat, so that brooding may be duly fostered. The upper entrance should be closed, and the lower one contracted, on the day after the cleansing.

On the day of the cleansing, or certainly on the following day, if mild, the workers will issue in quest of pollen and water for the brood. But as

there are few flowers in bloom at this early period, they make many bootless excursions, and numbers perish. It is, therefore, advisable to furnish them with rye-flour or oat-meal, which are excellent substitutes for pollen. Water, somewhat sweetened with sugar at first, may be placed for them in some warm, sheltered place, convenient to the apiary, but a few rods distant. The meal may be sifted lightly into the cells of old drone comb, or placed in a shallow trough or box. The water should be in earthen ware dishes, and some moss, or pieces of clean sponge may be dropped in it, to save the bees from drowning. By previously offering them some honey on the spot where it is intended to place the flour and water, the bees may readily be trained to resort thither for supplies. They will carry in flour or meal only so long as they cannot find pollen, and it is useless to offer it to them afterwards; but they should be regularly supplied with water till the spring is fully open, and they are gathering honey plentifully.

All writers on bee culture, concur in advising that only strong colonies, which need no feeding, be wintered; and I have given the same counsel. No doubt this is excellent advice; but will probably be of as little service to beginners, as that of the old lady to her son, not to go into the water till he had learned to swim. *Beginners*, rarely have strong and well-supplied colonies in the fall, and are constrained to winter such as they have, or none at all; and it will frequently happen that by the middle of March, their stocks have consumed their stores, and are in a state of destitution. What is to be done in such cases? The teachers say:—"give them plenty of honey, especially in sealed combs." But beginners usually have no honey, either in combs or cans, and are compelled to buy such as they can get. Cuban honey is commonly resorted to as the best and cheapest substitute, and is simply diluted with water, poured into some shallow vessel provided with a float, and set within the hive on the bottom board. This is a decidedly bad mode of feeding, because it is *unsuitable*, *dangerous*, and *expensive*.

It is *unsuitable*, because the sole object of feeding, at that time, is to give the bees just such supplies as their own necessities and the wants of the existing brood require. But, by feeding diluted honey the bees are tempted to lavish consumption, and stimulated to increase their brood inordinately. They are, as Ehrenfels expresses it, induced to "imagine that nature furnishes what man supplies." Much honey is thus misappropriated, as the brood requires quite a large amount for its healthy development. This might still be well enough, if the population were correspondingly increased—whereas the contrary is more frequently the result. The superabundance of brood constrains the bees to make reiterated excursions, partly to procure pollen and water, and partly to discharge their fœces. Hence during the rough and cold weather, more bees are lost than the emerging brood supplies. In short, experience teaches that a strong increase of brood in March, superinduced by supplies of diluted honey, is decidedly disadvantageous and useless.

Such feeding is *dangerous* likewise, as it exposes the colony to be attacked by robbing-bees; and if the honey be impure or possess noxious qualities, it may introduce disease. These dangers may be avoided by the use of sugar-candy, which is an article undoubtedly better adapted in every way for winter or spring feeding, than diluted honey. The simplest mode of supplying bees in common hives with this food, is to cut a hole about three inches in diameter, in the top of the hive; then take four pieces of board, four inches square, and nail them together, so as to form a small box without top or bottom; set this over the hole in the top of the hive, closing the interstices between hive and box with damp clay. Now fill the box with lumps of candy, cover it with a piece of coarse linen, place a close-fitting board on it, and secure it by a weight to prevent it from being blown off. The bees will enter and supply themselves according to their wants, and more candy may be given to them when needed. If the beekeeper has or can procure some old thickened honey, which may be cut with a knife, like butter, he may use it instead of candy. It will answer nearly as well, though more of it will be required, as it is more readily soluble.

Feeding with liquid honey is also *expensive*. It has been found on trial that it costs fully three times as much as the candy which would be required. The latter is consequently much the cheaper article, and the former should not be used when it can be avoided. Nor should bees ever be fed *from below*, unless the population be so reduced and weak that it could not well avail itself of supplies placed above. Absolute necessity is the only excuse admissible for feeding below, when the object is to save a colony from starvation.

I may add that there is a great difference in the quality of candies. The amber-colored semi-transparent kind, prepared for domestic use, is the least suitable for bee-feed. The cheaper brownish-colored is to be preferred, as being more easily and more perfectly soluble, and hence attended with less waste.

On a clear mild day, about the middle of March,

all the colonies should be thoroughly re-examined, to ascertain whether they have healthy fertile queens, the evidence of which is the existence of capped brood in worker cells. If any of the worker cells are somewhat elongated and sealed with prominent convex caps, they contain drone larvæ. If such cells are numerous, they show that the queen has lost, or is beginning to lose, her ability to lay worker-eggs; or, if no queen be present, that they are laid by a fertile worker. An easy mode of ascertaining the internal condition of a common hive, is to blow in a few whiffs of segar smoke through the entrance; then gently raising it and puffing in a few more whiffs among the combs. The hive may then be taken from its stand, inverted and placed obliquely on the ground to allow the sun's light to fall between the ranges of comb. If no worker-brood is then to be seen, the hive should be marked as suspicious, and examined again a week or ten days later. When a hive is removed, the droppings on the bottom board should be carefully scrutinized. If partially mature worker-larvæ be found there, further search is needless, as the hive has a fertile queen.

Weak colonies, and such as are suspected of being queenless, should be carefully watched. The entrance should be diminished in size, to permit only one bee to pass at a time. This is useful to prevent incipient robbing, and it is much easier thus to prevent attack, than to arrest it when once seriously made. I shall, hereafter, take occasion to discuss this topic more at large, and content myself at present with advising that weak colonies which have been repeatedly attacked, be broken up—reserving the good clean comb for future use, in movable comb hives, and uniting the bees with those of some other stock, after sprinkling them with sugar-water to procure them a kind reception. If any brood is found, cut out the comb containing it, and insert it between the combs of some other colony, where it may be duly cared for.

Some writers recommend transposing weak colonies which have a healthy queen, with some populous one in the same apiary. I tried this experiment years ago, and found that it produced no real advantage, at least when resorted to in March or April. The strong stocks were invariably much more injured than the weak were benefited by the process.

Colonies found to be queenless or drone-brooding before the middle of April, should forthwith be broken up. The insertion of worker-eggs or brood in such colonies, to enable them to rear a queen, is sheer waste of time. It may be useful after the middle of April, if the colony is populous, but *only* when that is the case. It may occasionally, though rarely, prove successful with a drone-brooding stock; but it is difficult to decide whether it is ever of any real service. I am inclined to think that it is not.

2. IN MOVABLE COMB HIVES.

During the period under consideration, the management of movable comb hives is not *essentially* different from that of common hives, save in two respects—and these are precisely those which clearly exhibit the superiority of such hives. They are of themselves sufficient to induce any intelligent beekeeper to introduce them in his apiary, and will finally lead him to the gradual disuse of every other kind.

In the first place, movable frame hives enable the beekeeper to ascertain the exact condition of his stock at any time. He can know certainly whether a queen is present or not, and whether she is healthy and vigorous, by simply lifting out the frames and inspecting the combs.

In the second place, weak colonies can be readily reinforced by means of combs containing sealed brood, taken from time to time from strong stocks, and inserted with all their adhering bees. With reasonable attention and little trouble, all the stocks in an apiary may thus be brought into good working condition before the end of April. This alone is a highly important advantage. And yet beginners must be cautioned against availing themselves of the process in hot haste and with overweening confidence. If it is not to do more harm than good, a thorough acquaintance with the internal economy of colonies is an indispensable pre-requisite; and this is precisely what *beginners* are most deficient in and least conscious of. They should experiment in this way very moderately, and content themselves with a small increase, till practice and experience enable them to operate on a larger scale.

Stock should be treated in the manner directed till the end of April. All needless disturbances should be avoided. At this season bees still require repose.

Some of my readers may think that I have omitted to notice one important item, namely, the *pruning* of stocks, which is usually done about the time when gooseberry bushes are in blossom, and is regarded as of the utmost consequence. I, too, consider it a matter of vital importance, involving *the ruin of bee-culture in poor districts,* as I shall endeavor to show in a future article.

A. B.

"In good honey years, every bean-pole sweats honey."—*German Proverb.*

Honey Districts.

In *poor* honey districts, that is, in such as have bee pasturage only in spring and the early part of summer till about the first of July, and where bees have no opportunity to forage on later crops, such as buckwheat, or from wild fall flowers, the endeavor of the beekeeper must be, by keeping only populous colonies, to enable his bees to secure their year's supply of stores early in the season. In other words, he must have them in a position to do as the farmers do—"make hay while the sun shines." He should also refrain entirely from *pruning* his stocks in the spring; or at most pare away from the combs, in his old-fashioned hives, only so much as is absolutely necessary to remove the *droppings* which have accumulated on the bottom boards during winter—cutting away not more from the combs than will suffice to allow the bees a free passage below. If he uses movable frames, and some of the combs remain still full of sealed honey when the gathering season has fully come, he may remove them; but should, if possible, insert frames with empty comb instead. He should likewise, if practicable, supply with empty *worker* comb the hives in which he placed his first swarms, and all his earliest-made artificial colonies. His bees will then be in a condition to labor unremittingly, and will sedulously avail themselves of every opportunity to appropriate the supplies which nature then dispenses with a lavish hand. When this has been accomplished, and pasturage begins to be less abundant, the proper time for encouraging comb-building has arrived. The full and sealed combs should now be removed from the honey chambers, and combs containing sealed brood may be transferred to strengthen weak stocks. Colonies which begin to remit their exertions and appear to contemplate swarming, will, by such transfer, be induced to commence building combs, and be constrained to postpone swarming indefinitely. Old and young will co-operate energetically, and the vacuum resulting from the removal or transfer of combs, will speedily be filled. Early and extensive pruning would have operated disadvantageously, by depriving the bees of empty cells needed for storing honey, and compelling them to build comb at a time when they should be employed in gathering nectar from every opening flower. Matters should be so managed as to have the comb-building deferred till the period when swarms usually issue. *He, who* IN POOR HONEY DISTRICTS, *prunes freely in early spring, will usually find empty combs, and no surplus honey, as the result of his management.*

But in *rich* honey districts, such as furnish only moderate pasturage in spring and the earlier part of summer, but an abundance of it in the latter part of the summer and in the fall, a different policy should be pursued. There the bees should be induced to do their comb-building *in the spring* and early part of summer; and there *spring pruning* is in place, if it be not done too early. Just before the season fairly opens, and the bees begin to gather, is the proper time. Brooding will not then be seriously interfered with, because the extended space already occupied by the brood will necessarily restrict the pruning within legitimate bounds; and at such times, and under such circumstances, comb-building proceeds rapidly, and the now daily emerging young, furnish empty cells nearly or quite as fast as the queen requires them. The queen also is thus induced to deposit her eggs chiefly in the upper portions of the combs, from which the older stores of honey are now removed for the nourishment of the brood, and to supply with material those bees engaged in building comb. If swarming and the making of artificial colonies be somewhat delayed by this mode of management, no harm results; for there is yet "a good time coming" in districts where the chief honey harvest occurs in the latter part of summer and in autumn. Yet it is advisable, even in such districts, to furnish swarms and young colonies with an ample stock of empty combs when practicable, that they may speedily become populous and be prepared to gather abundantly when nature opens her exuberant fountains. To this end, every piece of good clean worker comb should be preserved at the spring prunings, and employed to lighten the labors of the bees at this more busy season. If thus managed, the colonies will be in a condition to work to advantage while fall pasturage abounds, and honey will be rapidly stored up. He who in *such* districts *does not* prune his hives at the proper time in spring, and preserve his good combs for future use, will find in autumn that his bees will remain comparatively idle for want of room to garner what they might gather. The combs will be filled with brood, and when the season ends, little provision will have been made for the coming winter.

I will illustrate what I have said by some striking examples—premising that I reside in a *poor* honey district.

1. In 1857, I persuaded one of my neighbors to allow one of his straw hives to remain unpruned in the spring, except for the removal of droppings. It produced a large early swarm and thirty-six lbs. of surplus honey. In 1858, which was with us

a better honey year than its predecessor, the same hive was pruned on the 15th of April, and about half a lb. of wax removed, at the urgent request of the owner. The product was one weak late swarm and *no* honey. The swarm, with all the comb it built, was not worth a dollar on the first of August. The comparative result was—

1857, One Swarm, worth	$2 50	
36 lbs. Honey, at 15 cts.	5 56	
		$8 06
1858, One Swarm, worth	$1 00	
½ lb. Wax,	16	
		1 16
Difference,		$6 90

Which is equivalent to 46 lbs. of honey.

2. Standing near the straw hive, in the same apiary, was a box hive, which was left unpruned. It produced in 1858,

34 lbs. honey, at 15 cts.	$5 10
The straw hive produced	1 16
Difference,	$3 94

Which is equivalent nearly to 26¼ lbs. of honey.

3. On the 28th of April, 1858, I pruned from one of my box hives ¾ lbs. of wax, and from another 1¼ lbs. Two others in the same apiary, and of the same size and quality, were left unpruned. The latter two yielded,

Two swarms, worth	$5 00	
40 lbs. of honey, at 15 cts.	6 00	
		$11 00
The former two yielded,		
30 lbs. of honey, at 15 cts.	$4 50	
2 lbs. of wax, at 32 cts.	64	
		5 14
Difference,		$5 86

Which is about equivalent to 39 lbs. of honey.

Hence, in these instances, the cost of producing a pound of wax and one very weak swarm, was—

Example 1,	46	lbs. of honey.
" 2,	26¼	" "
" 3,	19½	" "
	3) 91¾	
On the average,	30½	lbs. of honey.

☞The Baron of Berlepsch notes it as a singular fact, that *young queens just beginning to lay*, and old queens *just recommencing to lay in the spring*, not unfrequently deposit drone-eggs in worker-cells, without subsequently showing any evidence of practical derangement. This exceptional drone-egg laying seems to be merely the result of some transient irregularity.

CHEMICAL ANALYSIS OF THE ROYAL JELLY.

BY DR. DÖNHOFF.

The royal jelly, with which embryo queen-bees are fed, contains animal albumen and fibrine. At least nine-tenths of the mass consists of these. This is evident from the following tests:

1. If the jelly be treated with ether and water, the pure substance alone will remain. This is whitish, translucent, and elastic, having all the appearance of coagulated albumen and fibrine.

2. If the jelly dries up in a royal cell, (as is the case particularly in queenless and drone-producing colonies, where the bees undertake to rear a queen from a drone larva which invariably perishes in the process,) it becomes transformed into a tough, yellow, transparent mass, like that into which protein substances are converted.

3. If the wax and sugar be extracted from the jelly by ether and water, and a solution of sulphate of copper be added to the residuum, oxide of copper will be precipitated by caustic potash; but the solution will retain the blue color of the salt.

4. The mass remaining after treating the jelly with ether and water will be completely dissolved by a solution of caustic potash, assuming a faint yellow tinge, and on the addition of muriatic acid will emit an odor resembling that of sulphuretted hydrogen.

Ingredients present in minute quantities only, are:

1. *Wax.* When I treated the jelly with ether, there remained on evaporation by heat, a white mass having an unctuous feel, and which, when warmed, rendered paper transparent and glossy.

2. *Sugar.* When the jelly was digested in water holding sulphate of copper in solution, the addition of caustic potash produced a brownish-yellow precipitate.

3. No trace of pollen or starch could be detected, by employing the usual re-agents.

The presence of albumen and fibrine shows that the jelly is an animal secretion, and should be designated by some more appropriate name.

It seems probable that the secretion is effected by a gland in the gullet or æsophagus, since jelly is never found in the stomach of the bee.

☞Artificial colonies are more apt to succeed well or thrive, if the bees of which they are composed are taken from different hives. The queen and a few hundred bees may be taken from one hive, and the rest of the workers required, from two or three others; and the new colony thus constituted should be sent to a distant stand, at least a mile and a half or two miles from the old apiary.

Bee Culture in Greece.

Bee culture is a source of very considerable private revenue among the modern Greeks. Indigenous aromatic plants abound in the mountainous portions of the country; and to them, doubtless, is to be attributed much of the excellence for which Grecian honey is celebrated.

The Attic hives are of a peculiar construction. They are formed of clay, glazed and burnt like common earthenware. Their form is cylindrical. They are from three to four feet high, and from twelve to eighteen inches in diameter; and have a movable top. They are usually placed with the entrance facing the east or the west, as the bees suffer from the cold northerly winds of the country. To protect them from the rays of the sun, they are shaded in summer by the foliage of vines and climbing-plants, cultivated and trained for that purpose. They are sometimes arranged in rows against a wall, or under the shelter of a hedge; and occasionally we find an apiary covered with a substantial roof. Unfrequented and secluded spots are generally selected, such as the ruins of churches and deserted cloisters, in the vicinity of brooks and streamlets; and shallow ditches are sometimes dug to convey water near the apiary, and strips of boards or other timber are placed therein for the bees to alight on.

Artificial multiplication of stocks is sometimes resorted to, and executed in a rude manner. For this purpose several pieces of comb containing honey and brood are cut out and inserted in one of the above-described hives, which is then placed on the spot from which a populous colony has been removed. The exterior of the hive is rubbed with balm leaves to make it more acceptable to the returning bees, which take possession of it and rear a queen from the brood it contains. Natural swarms, when they cluster in a favorable location, are usually secured in a swarming net or bag, preparatory to hiving, and subsequently transferred to a hive when all the arrangements requisite have been completed. When a swarm settles in a spot not readily accessible, it is dislodged by the use of smoke, and when practicable driven into the swarming net. It is customary to unite two or more weak colonies, since it has been found by experiment that while a colony of four thousand bees will yield only eight pounds of honey, one of eight thousand will yield twenty-four pounds—double the number of bees producing nearly four times the amount of honey.

In Greece, bees swarm three or four times in the course of the season; but only first swarms are certain to thrive. The latter ones being weak, and having a brief period of good pasturage in which to labor, can not gather stores sufficient to enable them to pass the winter in good condition, and many perish of hunger.

The honey harvest takes place in September and October, at which time as many of the combs containing honey are cut out as it is thought the bees can spare.—These combs are drained of their contents by placing them in dishes exposed to the sun; thus separating the honey from the wax, without employing artificial means.

To enable the bees to economize their stores during the winter, the stocks are not unusually carried into a dark room where a low temperature prevails, and kept there till the return of spring. This is the customary mode of wintering bees in Mesopotamia, and on the island of Poras.

The best honey provided in Greece is that of Mount Hymettus, so highly extolled by ancient writers, and deemed not less worthy of praise by those of later dates. Next in favor ranks the honey of the Pentelikon, and then follows that of the isles. A very peculiar kind of honey is produced at Kargetos, in the island of Euboa. In a wild uncultivated district near that city, there are extensive tracks overgown with raspberries, dog-roses, and oleanders, furnishing the bees with a superabundance of most excellent pasturage. This honey has a delightful flavor of roses, and was in special repute and demand under Turkish *regime*. The resident Pasha then claimed a monopoly of this delicious product, and annually sent the choicest of it to Constantinople, as a present to the Sultan; nor was it allowed to be sold to others under the penalty of death.

In favorable years, 40,000 occa of honey are exported from Greece, principally to Trieste, Marseilles, Leghorn, and Malta; and about 400 cwt. of wax are sent anually to Trieste and Marseilles. In Greece, wax is generally used in its unbleached state, in the manufacture of tapers.—Dr. Klages.

CHILLED BEES.

In the month of March, Capt. Baldenstein gathered from the snow on which they had fallen, a large number of chilled and apparently dead bees. He laid them on the alighting board of one of his hives in the evening, and closed up the apiary. On re-opening it next morning, at 10 o'clock, they still lay there without any sign of life. But after the sun shone on them awhile, the greater part of them revived, and flew to their respective hives. They had remained in a benumbed state sixteen hours without being really killed.

SWARMING AND HIVING.

To attract and arrest natural swarms when issuing, and be able to hive them more conveniently, I remove the bottom boards from several of my most thriving and populous colonies, replacing them by extra boards kept for the purpose. To each of the removed boards I fix three hooks in such a manner that each board may be suspended horizontally by cords from the limb of a tree, with the side which was next to the bees turned towards the ground. I drop some melted wax on the side which will thus be undermost, and attach to it a small piece of clean comb. When the swarming season approaches, I suspend the boards thus prepared under a tree or trees twenty or thirty feet from the front of my apiary, and five or six feet from the ground. I find that the swarms which issue will almost uniformly cluster under these boards. When the bees have become settled, the board is lowered gently, and the swarm hived. The board is immediately suspended again to attract any stragglers flying about, which are afterwards carried to their companions in the hive. On very warm days, swarms are inclined to rise higher than usual, and to provide for such a contingency, it is well to suspend one of the boards at a greater elevation than the others. I have successfully used this method more than ten years, and can recommend it to those who still permit natural swarming.—J. HILDEBRAND.

QUICK WORK.

The rapidity with which bees will build comb and gather honey, under favorable circumstances, is so extraordinary as to be almost incredible. Mr. Brink says, that he has known a strong swarm to fill its hive with comb in seventy-two hours; and that colonies expelled in August, put into empty hives, and transported to the heaths, would fill the hive with new comb and gather from thirty to forty pounds of honey, in the brief season for work in which they could labor. In the spring of 1853, one of his neighbors carried his stocks, whose stores were nearly exhausted, to a distant rape field then in blossom. The weather was raw and unfavorable at the time, but suddenly changed, becoming mild and clear. The bees labored so successfully, that after a few days his neighbor called on him for advice, saying that the liquid honey was running in streams from the hives. On examination it appeared that all the combs were filled to overflowing, in consequence of the superabundance of nectar supplied by the rape blossoms, and the indefatigable industry of the bees in gathering it. The soil on which the rape grew was a calcareous marl.

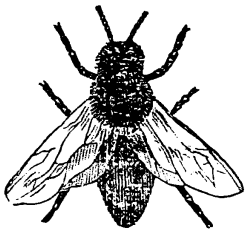
BROOD A STIMULANT.

On the 1st of July, a second swarm issued from one of my hives. On examining it on the 10th, I found that no eggs had been laid, and inferred that the queen had not yet been fecundated. In order to strengthen the stock, and possibly encourage it to labor more industriously, I inserted a small piece of comb containing worker-brood, but no honey. This was done at four o'clock in the afternoon, and within thirty minutes after, my attention was attracted by the busy and seemingly joyous flight of the bees. At five o'clock I saw the queen returning to the hive from an excursion. On the following day I neither saw her issue nor return, and on the evening of the 12th, I discovered that she had commenced laying eggs. Suspecting that the insertion of the brood had incited her to issue, as she came forth so soon after, I was induced to try the experiment with two other after-swarms. I inserted brood comb in each of them, on the fourth day after they were hived. Three days thereafter, one of the queens proved to be fertile, the other was lost. I supplied her place by a young queen just hatched, which began to lay on the morning of the fourth day after she was put in the hive. J. G.

RED CLOVER.

When it happens that bees cannot gather honey from other sources, while the red clover is in blossom, bees will occasionally resort to this plant for supplies. But they find it difficult to accomplish their object, because the tube of the blossom is so long and narrow, that they cannot reach the nectaries in the usual manner. They can only gain access to them through a slit in the tube, situated between the calyx and the corolla. The tube has only two such slits, and the bees are not always successful in their efforts to extract the nectar through them. The humble bees, having the advantage of a longer proboscis, readily reach the nectar through the mouth of the tube. The blossoms of white clover, as well as those of white and yellow mellilot, have short tubes; and the bees encounter no difficulty in extracting honey from them.

REV. MR. KLEINE says, that on examining the wings of Italian and common bees with a microscope, he could perceive no difference of size; but that the nervures, particularly of the radial cells, are more delicate and beautiful. He does not think that the bodies of Italian bees are normally smaller than those of common bees, nor that there is an appreciable difference in their average weight.



The Drone Bee.

We now proceed to notice the drones, which are bees of larger size, stouter, and more squarely built, than the workers. They commonly make their appearance in the hives in April, May and June; and are usually expelled from the colonies, by summary process, in July or August. The head of the drone is more spherical than that of the worker, the body is more bulky and hirsute, and the abdomen terminates more obtusely. They fly more heavily and make louder humming when on the wing. But their apparently most distinguishing characteristic is the want a sting, which constitutes the formidable weapon of the worker, and with which even the queen is armed.

Singularly discrepant and contradictory opinions respecting the sex and functions of this kind of bee have been entertained by eminent apiarians, and are still cherished and advocated by recent writers. Some, indeed, go so far as to refuse to acknowledge them to be natural and necessary members of the busy commonwealth, regarding them rather as misbegotten monsters or parasitical intruders. Such extravagant notions scarcely deserve notice, otherwise than as curious vagaries not seriously requiring refutation. The workers build the cells in which the drones are bred; and the queen, in healthy colonies, lays the eggs from which they are hatched. They and the workers are the offspring of the same mother, and have an equal claim to be regarded as constituent members of the community.

But, conceding their rank and equality, of what sex are they, and what is the design of their brief and monotonous existence? Are they substantive elements, or mere adjuncts, like the transitory sepals of a blossom?

Some regard the drones as *neuters*, designed merely to generate and maintain in the hive the requisite degree of heat, during the brooding season, when a large majority of the workers may be abroad busily engaged in gathering in their harvest. They accordingly call them *brooding-bees*, and contend that the production of heat is their exclusive vocation. No plausible reason can be assigned in support of this notion. At the period precisely when the drones are most numerous in a hive, it contains the smallest amount of brood. When the old and fertile queen leaves with the first swarm, comparatively few drones have been hatched, unless swarming was delayed by unfavorable weather. Yet, with the departure of the queen, egg-laying ceases and the brood diminishes from day to day. Then, when in the course of three or four weeks, the young queen having become fertile, brooding has recommenced, and is vigorously prosecuted, and there might seem to be occasion for their services were they brood-bees, the drones are suddenly expelled, as useless supernumeraries. Does not this clearly show the absurdity of the notion?

But, since the worker-eggs are susceptible of development as queens, and are hence unquestionably females, does not the strikingly different organization of the drones of itself warrant the conjecture that they are males? And that which may thus be fairly inferred, has been demonstrated to be true by dissection, which proves that they possess male organs of generation. It is, moreover, confirmed by the experience of practical beekeepers, that a young queen prevented from having concourse with a drone, or bred early in the spring before drones have made their appearance, remains sterile; and that in years when few drones are produced, many young queens remain barren, and others become fertile only after making repeated excursions. This not only shows that the drones are the males, but that the fecundation of the queens would not be certainly effected, did the drones not exist in great numbers at the proper period. Queens have been observed to make excursions daily for three weeks before they commenced to lay, at a time when but thirty or forty drones could be found in the apiary; yet subsequently, when the latter could be counted by hundreds, all the young queens were fertilized and commenced laying within a week after they emerged. Drones being designed to fecundate the queens, and that being feasible only on the wing, they leave their hives at about noon on every fine day; and the young queens invariably make their excursions soon after. Without them, the queens would remain barren, and the race could not be perpetuated. This is the sole purpose of their existence.

Strong colonies alone and such as, in the consciousness of increasing numbers, contemplate swarming, produce drones. After the swarm has departed, and when the young queens are making their nuptial excursions, the drones are always most numerous. True, a colony which does not swarm, or rears no queens, would have no occasion for drones. But as the contingencies which may prevent swarming cannot be foreseen, drones

are nevertheless produced, because in the event of being wanted they could not be suddenly bred. Hence the objection that non-swarming colonies ought not to rear drones, is about equivalent to arguing that a tree should not have blossomed because a frost destroys the fruit.

Drones might much more appropriately be called swarm-bees, because their appearance is always in so far connected with natural swarming, as it is an evidence of that strength and vigor in a colony, which alone justify the expectation that a swarm may issue. Ordinarily no colony sends forth a swarm unless it has drones, or drone-brood in process of hatching. And neither the new queen retained in the parent hive, nor any of the queens of second and later swarms could be fecundated, if nature had not made provision therefor by the contemporaneous production of drones. The young queens might, indeed, be fecundated by drones from some other colony. But nature could not trust to chance, and always provides for each swarm whatever is requisite in this respect, for its independent existence. As the young queens of second and later swarms make their excursions from the locality which these have selected, or in which the new hives are placed, they always contain a greater proportional number of drones than accompany first swarms, and most of these have emerged after the first swarm left.

Those who ascribe to drones some secondary use or purpose, usually refer to the great number produced as indicating the correctness of their views. "Why," say they, "are hundreds or thousands of drones bred, if a single one is sufficient to fecundate the queen?" But, from what has already been stated, the great uncertainty which attends the fecundation of a queen is obvious, or she would not when drones are scarce, have to make repeated excursions, and incur the numerous risks attending them. A great multitude is indispensable to diminish risk, and prevent delay. The drones do not and cannot all leave the hive at the same time, and natural swarming so divides and subdivides their number, that ultimately each swarm has not more than an adequate supply.

An undue proportion of drones, however, is the result of improper management or of an unnatural condition of the colony. When a first swarm issues seasonably and is placed in a hive of suitable dimensions, such as it can fill with comb in a short time, comparatively little drone-comb is built; and a second swarm rarely builds any during the first season. But if the hive be inordinately large, or be prematurely enlarged in the ensuing spring—which is usually and almost unavoidably done by those who practise the *nadiring* system—the bees are induced to fill most of the space with drone-comb. In process of time, under this system, the proportion of worker to drone-comb becomes completely reversed; and, as the cells condition the brood, a multitude of drones are reared, with comparatively few workers. But under an improved and rational system, which gives the apiarian complete control of the combs and the bees, such results can be effectually prevented, and the production of drones limited within such bounds as may be desirable. It is, accordingly, a great advantage to be able to remove the drone-combs out of the brooding chamber, and substitute worker-comb for them.

Bees are well aware that drones are absolutely indispensable in certain conditions of the colony. At the very time when, from want of pasturage and the unfavorable state of the weather, other colonies will destroy even the drone larvæ, those which are queenless and engaged in rearing queens will cherish their drone-brood as carefully as they do the royal cells. Hence, if for any special purpose, such as the fecundation of young Italian queens, we desire to preserve a stock of drones to the period at which ordinarily none exist, it is only necessary to remove the queen from a colony before the drones are expelled. They will then certainly be retained and fostered till the queens have emerged and are fecundated; and by a timely removal of the royal cells, the further preservation of the drones may be secured. Another decided proof of the importance which, in certain circumstances, attaches to the drones, is furnished by the fact that it is not safe, when endeavoring to rear queens artificially, to select for the purpose a comb containing both worker and drone-eggs and larvæ. The bees will be apt, in such case, to direct their chief attention to the drone-brood—at times even attempting to raise queens therefrom, by converting drone-cells into royal cells, instead of recurring to the worker-brood, as they otherwise would instinctively do. It is, therefore, best to furnish them with worker-eggs and larvæ exclusively at first, and introduce drone-larvæ only after the royal cells have been started on the worker-comb.

Queenless colonies retain their drones, in part because, though aware of their destitution, they still indulge a hope of being able to rear a queen, and in part because, in such a colony, a misguided spirit predominates—leading ultimately to dissolution and destruction. Some queenless colonies also will continue to produce drones long after they have been expelled from those supplied with queens. This well-authenticated fact led some apiarians to suppose that the queen does not

lay the drone-eggs, but that these proceed from a distinct kind of bees which they dignify with the title of drone-mothers. But to argue thus from what occurs in a diseased or abnormal colony, is as irrational as would be an attempt to infer the laws of mind from the idiosyncracies of the inmates of an asylum for the insane.

After the expulsion of the drones, the queen rarely, if ever, dies a natural death. If she did not perish from exhaustion when laying thousands of eggs daily, in the spring, she is not likely to do so later, when laying only a few hundreds. If she die casually when no drones exist, the colony may generally be regarded as doomed to speedy destruction. Even the rearing of a few drones will not always save it, unless the weather continues sufficiently mild to enable them to fly, and permit the young queen to make the indispensable excursions with success.

The long controversy respecting the origin of the drones, was conclusively settled only by the introduction of the Italian bee. It was found that on the removing the queen of a common colony, and substituting an Italian queen, all the drones subsequently produced, were of the Italian race, and that consequently the queen, in a healthy colony, lays both drone and worker-eggs. But though this is the case in every normally-constituted colony, it is equally certain that there are individuals among the workers capable of laying eggs, and which sometimes do so, on the death or removal of the queen. When this occurs, they are not unfrequently regarded and treated as queens by the workers; and if the colony be populous, it will, for a considerable period, show no evident symptoms of queenlessness. Their owner will not easily become aware of their true condition, unless he can inspect the combs, and see what kind of brood they contain. It is exceedingly difficult to restore or save such a colony. The workers are prone to neglect rearing a queen from worker-brood, when offered to them, and will even refuse to receive a fertile queen, if introduced among them. The better course is to break it up, and save the bees, by removing it to some other spot in the apiary, and setting a weak stock in its place. The returning workers, as they successively leave their old hive, will resort to this, and in a few days the fertile worker will be deserted by all but a few obstinate or devoted adherents. The queen of the substituted stock should be confined for a short time to insure her safety; and the combs of the deserted hive may then be cut out and reserved for use.

The refusal of queenless drone-breeding colonies to receive an offered fertile queen, shows that the bees regard the fertile worker as their queen; and consequently, that two egg-layers, though one be a drone-mother, are not ordinarily tolerated. Sometimes, when worker-brood and larvæ is given them, and royal cells have been started, if a fertile worker begins to lay, the embryo queens will be summarily destroyed. Sometimes, too, the fertile worker will cease to lay when worker-brood is inserted and a royal cell started, remaining thus in abeyance; but will at once recommence if the royal cell or the emerged young queen is removed. These differences in deportment, perhaps result from the different degrees of development to which the fertile workers have attained, or their greater or less resemblance to a perfect queen enabling them to exert, accordingly, a greater or smaller amount of controlling influence over the workers. It seems probable, likewise, that there is always only one individual that actually lays eggs, though a greater number may be more or less qualified to do so: and that this actual laying suffices to secure for her a *quasi* respectful recognition as of queenly dignity.

There remains to be noticed another point, to which we shall advert only briefly on this occasion. Does the drone-egg require impregnation in order to become susceptible of development. Dzierzon maintained the negative, and his opponents the affirmative of this question. We need not here state the arguments used by either side in support of its opinion, because the matter has been settled by an appeal to facts. If drone-eggs do not need impregnation, then Italian queens must constantly produce Italian drones, and common queens common drones, though fecundated by drones of the opposite race. And such is the fact. The concurrent testimony of all observers, whose reports we have, is that Italian queens, fecundated by common drones, do invariably produce Italian drones, as fully and perfectly marked as, and in no respect different from, the drones produced by Italian queens fecundated by drones of their own race; and that a corresponding result occurs in the case of common queens fecundated by Italian drones.

Mr. Rosenman suggest that the disease called foul-brood, may be caused by nitrogen gas generated during the winter in a hive not properly ventilated, and insufficiently protected against cold.

☞It is a remarkable fact, that the indentations like those with which royal cells containing female larvæ are decked, as if for ornament, are never found on royal cells which contain drone larvæ

Peculiarities of the Royal Cell.

We are usually told that the embryo queen, on attaining maturity, liberates herself from the royal cell, on the 14th or 15th day, by piercing its cover or cap with her mandibles. All very true. Still it does not inform us *how* or *under what circumstances* this liberation takes place; and it is to these minutiæ that I would now advert:

The young queen does not, unaided, work her way out of the cell. The workers are co-laborers on the occasion, evidently making the needed preparation for, and thus facilitating her enfranchisement. When the bees are constructing a royal cell, we do not find that its walls are, from the start, so thick and so indented or ornamented, as we see them subsequently. At first they are thin, and smooth on the exterior; but when the cell has reached its full length, the bees begin to thicken the walls and indent them externally.

On the 7th or 8th day, the larva being ready to undergo transformation, the workers close the cell with a slightly-convex cap or cover, rather delicate in structure, and as thin as those which are used to close worker or drone-cells. When this has been done, they proceed to thicken the walls of the cell-store more, using wax very lavishly for that purpose; at the same time deepening the indentations on its surface, so as to cause them to resemble rudimental worker-cells. This exterior thickening and ornamentation extends not only to the edge of the cap or cover, but considerably beyond, converging to an obtuse point and inclosing a hollow space. Thus two compartments are formed, the upper and larger of which is the original cell, and contains the embryo queen. The lower and smaller is empty, and appears to be intended to serve solely as a shield to the other. Its arched form enables it to resist external pressure more effectually, and thus protect the slightly convex cap of the true cell from casual injury, while the chrysalis is yet immature. If we take a royal cell a few days before the young queen is ready to emerge, and carefully dissect off this outer portion, the original and true cap or cover of the cell will be exposed to view; and on examination we shall find that it is entirely unconnected with the over-arching prolongation of the thickened cell walls.

When the embryo queen is nearly mature, within perhaps from 12 to 16 hours of the usual period of emerging, the bees begin to demolish this exterior compartment, reducing it to a level with the outer edge of the cap of the cell proper. Having reached that point, they smooth off the outer edges of the thickened cell walls in such a manner as that the orifice of the cell, when the queen has emerged, shall be perfectly circular. The cap, owing to its convexity, is now somewhat prominent in the middle, and being withal very thin, is exceedingly liable to be injured or broken. To protect it, therefore, the bees coat it over with fresh layers of wax until it becomes nearly as thick as the cell walls. Having thus provided for the safety of the royal nursling, their coadjutory labors are ended and they withdraw.

In this condition of the royal cell, egress is no longer difficult. The young queen commences operations by piercing a hole through the edge of the cover with her mandibles, and then making a circular cut along its periphery. Being thus detached from the cell walls, it finally drops, opening a circular passage through which the queen emerges.

The annexed illustrations will probably render this account more intelligible.

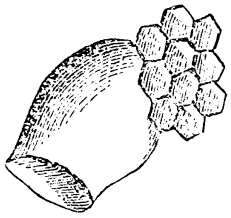


Fig. 1. Represents the royal cell as originally constructed, with the exterior suface still smooth and free from indentations.

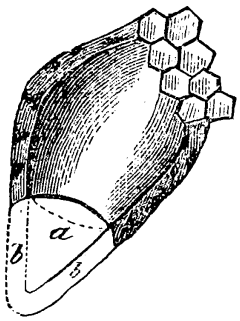


Fig. 2. Represents a finished and sealed cell, containing an embryo queen. Here the orifice *a* is capped, and the cell walls are thickened preparatory to being extended in the direction of the dotted lines *b b*.

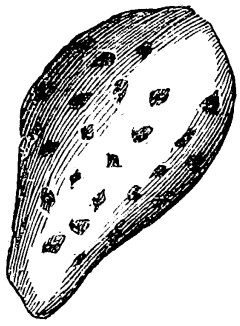


Fig. 3. Represents the cell thus elongated enclosing a hollow space exterior to the cap of the true cell, and exhibiting the indentation or ornamentation of the surface. The hollow space is sometimes so small as to be almost inconspicuous. The ornamentation when elaborately executed, resembles shallow or rudimental worker-cells.

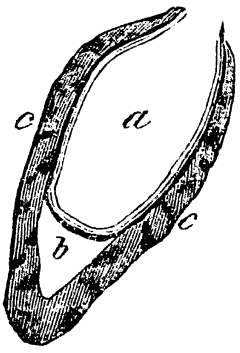


Fig. 4. Is a longitudinal section of fig. 3. The space *a* is the true cell; *b* the anterior hollow space; *c c* the thickened cell walls.

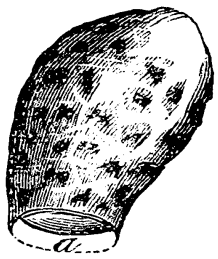
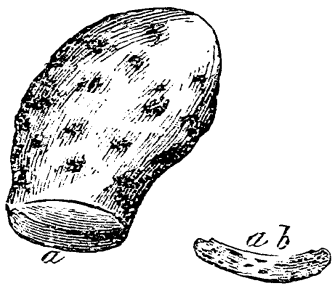
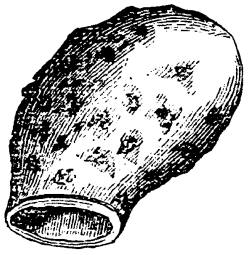


Fig. 5. Shows the cell as seen after the anterior compartment has been removed or demolished, exposing to view the convex cover or cap, *a*.

Fig 6. Shows the cap *a* thickened or strengthened, to secure the immature queen against injury. When severed from the cell by the queen's mandibles, the cap resembles *a b* fig. 6.





After undergoing these changes and modifications, the royal cell, forsaken by the queen, resembles fig. 7.

☞ The highly important fact that young queens soon after emerging from the royal cell, leave their hives to meet the drones, and that their fecundation is effected in the open air, was discovered by Janscha, the superintendent of the Apiarian Institute—established at Vienna, by the Empress Maria Theresa. Many years after, Huber confirmed the truth of the discovery, and made it more extensively known. But both Janscha and Huber were denounced as deceivers and charlatans by the conceited Spitzner, who denied that the drones were males, and that the queens ever made excursions to meet them. So well did he and his partizans succeed in suppressing the truth, by pertinaciously traducing its advocates, that it was lost sight of for more than half a century, and wholly disregarded till Dzierzon again brought it into notice, when proclaiming its intimate connection with his own system of bee culture.

☞ Every colony that contemplates swarming, will, for some time previous, cease to work as industriously as it might do in view of its members. A disposition to "hang round" indolently seems to seize a majority of the population, and they cluster together in masses, apparently for the purpose of helping each other to do nothing. But get control of them, permit no natural swarming, furnish them with continual opportunities to be doing something, and you will not perceive among them any tendency to idle away time.

CHEMICAL NATURE OF HONEY.

The nectar of flowers, as gathered by the bees, is a watery solution of cane sugar. With the aid of heat it gradually becomes converted into grape sugar. In the process of this transformation the cane sugar is decomposed into the three kinds of sugar which constitute honey. Hence, honey would seem to be a variable substance representing the transitionary stage of the conversion of cane sugar into grape sugar. All that the bees contribute to this process of transition and conversion, is the heat which they generate and maintain in the hive. The conversion can be effected by weak acids, as well as by moisture and heat.—M. Soubeiran.

HATCHING OF BEES' EGGS.

The time within which bees' eggs will hatch, depends very much on the temperature to which they are exposed. Gundelach says, that in one instance they were hatched within twenty-four hours after being laid. Berlepsch says, he has known them to remain unhatched, in the hive, for forty-eight hours, and in one case more than seventy-two hours. He also mentions that he once removed a comb partially supplied with eggs, and kept it in his room more than a week before inserting it in a hive containing a queenless colony; yet in due time the larvæ issued. Mr. Kleine also states, that he kept a comb with sealed brood, in a box twenty-four hours, in cold weather, then gave it to a strong colony, and the brood matured.

BEES IN SILESIA.

In the province of Silesia, 260,000 colonies of bees are kept, representing a capital of more than one million of dollars. These, even in the most unfavorable years yield a profit of ten per cent.; and in propitious seasons, such as the year 1846 was, the yield was fully one hundred per cent., or more than $1,000,000. It is well ascertained that the whortleberry and buckwheat blossoms are much richer in saccharine juices on the poor soil of Silesia than in more fertile districts.

☞ In March, 1850, Dr. Kittell discovered that one of his colonies required feeding, and being unable to procure either pure honey or sugar candy, he concluded to try common brown sugar dissolved in warm water, so as to form a tolerably thick syrup. He fed them with this freely, and had every reason to be satisfied with the experiment. Brooding commenced as early and was continued as regularly in the colony thus fed, as in any of those which had ample stores of honey.

The Italian Bee.

BY THE REV. GEORGE KLEINE.

(*Second Article.*)

Conceding, as we may from the evidence adduced, the practicability of preserving and perpetuating the Italian race in its purity, another and equally important inquiry presents itself.—Does the Italian bee really possess any qualities or properties entitling it to a preference over the common bee?

Capt. Baldenstein, who first called our attention to this race of bees, regarded it, from long experience and observation, as of high value in practical bee culture; and first suggested the important service it could be made to render in the elucidation of theory. M. de Prollius, who had long and extensively cultivated it in Italy, when appealed to, was lavish in its praise. And Dzierzon, than whom there is no more competent judge, declared it was, in all respects, an interesting and most valuable acquisition. The general judgment is decidedly in its favor, wherever it has been introduced.

We shall advert first to the benefits resulting from the introduction of this bee, in the final settlement of questions controverted among apiarians. So many novel principles had recently been suggested and advocated; so many old and long-forgotten opinions had been revived; and so many others, long-acknowledged and cherished, had been repudiated; that doubt and uncertainty prevailed extensively, and there was a readiness to seize and use whatever promised fairly to explode error and establish truth.

Respecting the fecundation of the queens, widely different and very contradictory opinions were entertained. Such of these as were based on imperfectly-observed facts or illogical deduction, readily yielded when subjected to scrutiny. But the mere concoctions of an idle brain, baseless, and purely imaginative, were more difficult to manage—there being in fact nothing to take hold of. Magerstedt and others contended that fecundation was wholly unnecessary, and that queens became fertile simply from "bodily exercise" in the open air, or from mere atmospheric influences. Now, so long as the matter could not be brought to some tangible test, such notions and others equally absurd might be avowed, and even challenge refutation, without incurring the risk of more than an occasional sneer. But all this was suddenly changed by the introduction of the Italian bees. Numerous well-authenticated cases were soon reported, where the occurrence of a mixed breed in colonies, showed that an actual concourse of queens with drones of a different race must have taken place. Young Italian queens produced an impure stock; and from young queens of the common race, sprang a progeny irregular and mixed. The fact of fecundation was thus established by its manifest results.

Then, also, recurred the much-mooted question, whether the fecundation of the queen, once accomplished, was efficacious during her life. This had frequently been discussed, but never conclusively settled, till it was determined beyond controversy, by an appeal to the Italian race. It was ascertained that an Italian queen, fecundated by an Italian drone, and introduced in a hive of common bees, continued, under all circumstances, to produce genuine Italian progeny during her life. This, in connection with the fact that it is exceedingly difficult to prevent young Italian queens from being bastardized, when common drones abound in an apiary, may be regarded as satisfactory evidence that fecundation continues effective during the life of a queen; and for this evidence we are indebted to the Italian bee.

The opinion that the queen is the sole mother of the colony, laying all the eggs from which the brood proceeds, had long been entertained, and was generally acquiesced in, till Riem made the remarkable discovery, that the workers, though usually regarded as neuters, were capable of laying drone-eggs. This discovery was, seemingly, so anomalous and incredible, that Bonnett, to whom Riem sent an account of it, cautioned him against announcing so manifest an error, lest he should forefeit his well-earned reputation as a careful and reliable observer. When Huber and others, subsequently, demonstrated that Riem's discovery was unquestionably true, Knauff immediately used it as the substratum, in part, of a new theory, which was very favorably received. According to it the queen lays only the worker-eggs, whilst certain female bees—which he called drone-mothers, lay the eggs from which the drones proceed. Dzierzon early attacked this theory, and thereby involved himself in a protracted controversy with its advocates, which was still prosecuted with all its original ardor and acrimony, when the Italian bee brought it to a sudden close. One of the most strenuous defenders of Knauff's theory announced that the Baron of Berlepsch had introduced Italian queens in hives of common bees, after removing the native queens. This was to serve as a test experiment. If in the following spring Italian drones were hatched in these hives, it would have to be conceded that the queen lays drone-eggs; but if common drones issue, they must be regarded as proceeding from

eggs laid by the workers: Expectation perked up her ears, and curiosity put on her spectacles, awaiting the result in eager anxiety. Spring came, and in due time an abundance of Italian drones issued, not only from the Berlepsch hives, but also from hundreds of others in which Italian had been substituted for common queens. Thus the new race became the means of settling, definitely, another important question in bee culture.

The most striking point in the Dzierzon theory, and one of the most startling physiological doctrines ever enunciated, is unquestionably his proposition that, among bees, the male sex is developed by parthenogenesis, and the female under the influence of male sperm. This doctrine was violently assailed on every hand. But Dzierzon, relying on his own personal observations, felt confident of its truth and maintained it against all opposition. Finally, when the General Apiarian Convention met, at Vienna, in 1853, he made the following announcement: "By the acquisition of the Italian bees, we are put in possession of the means of testing the truth or falsity of my hypothesis. If the drone-eggs are not influenced by the contents of the spermatheca, the drones must invariably resemble the mother, though she be fecundated by a drone of another race." Numerous and diversified experiments were instituted early next season, and the results being found in accordance with Dzierzon's anticipation, opposition at once subsided. Naturalists long obstinately refused to admit the truth of the doctrine, because it conflicted so directly with what they regarded as indisputable.* Finally, however, they also had to yield to the evidence, though they did so manifestly with the utmost reluctance, saying: "One of the most *inconvenient* facts, destroying all hope of ever discovering any general law regulating animal re-production, has thus been forced on the acceptance of physiologists." Thus was another controverted matter disposed of, with the aid of the Italian bee.

There was less difference of opinion as to whether the fecundation of the queen is effected in the open air, or within the hive. Janscha and Huber, with the greater number of intelligent observers, believed that the queen necessarily must and always does leave her hive to meet the drone. This was the general sentiment, but it was not unanimously concurred in; and many practical beekeepers still entertain doubt. But when Italian bees are introduced in any neighborhood where common bees are kept, a few seasons suffice to render the truth obvious. Young queens of the common race, will soon be found in various localities producing a mixt breed, though there be no Italian stocks within two miles of the apiary. Hence, these queens must, at least on one occasion, have left their hives to meet the drones; and to the Italian bees are we indebted for demonstrative evidence of the fact.

It was formerly a widely prevalent notion that the young bees were ready, and qualified, to engage in all the various labors and duties of the colony, at home or abroad, as soon as they emerged from the cell. Dzierzon was the first to express dissent, because his own observation led him to a different conclusion. His remarks may have induced some to doubt, but the general sentiment remained unchanged; nor was it till the Italian bees were introduced, that the truth, in this respect, was fully ascertained and acknowledged. On placing an Italian queen in a common stock, it is found that the young bees hatched from her eggs do not show themselves outside of the hive for nearly ten days after leaving the cells, though constantly occupied, meanwhile, in the interior. Nor do they begin to gather honey and pollen till they are nearly twenty days old. The difference in marking and color which distinguishes the Italian bees, made the fact so obvious, that the old notions had to be at once abandoned.

The comparatively brief life of the worker-bees, and the great mortality to which they are exposed, can in no way be so clearly exhibited as by the introduction of an Italian queen in a common colony. If early in May, such a queen be placed in a hive containing thirty thousand workers, scarcely a dozen of them will be found remaining on the first of August—the rest having perished, and their places being supplied by an equal multitude of another race.

Bees are commonly regarded as very inhospitable—unwilling to receive and entertain strangers. This is doubtless true, to a great extent, and in accordance with an instinct designed to secure self-preservation. Still the police regulations of the colony are not so stringent and exclusive as totally to prohibit the admission and naturalization of aliens. In every apiary where both kinds of bees are kept, some Italian workers will soon be observed passing in and out, peaceably and undisturbed among the common bees, and actively participating in the labors of the colony. Doubt-

* When men have, as they imagine, reduced a certain domain of thought to exact order, they are impatient of the springing up of contrary appearances, that, like the goblins in "*Faust*," will not "dance in time" to the measure that regulates the rest.—*Edinburgh Review*, Oct. 1859.

less similar migrations take place in all apiaries, but are unobserved because there is no difference in the color of the workers—all wearing the same livery.

From the foregoing statements, the importance of the Italian bee, alike as it regards the theory and the practice of bee culture, will be apparent. There are, no doubt, other points also, in which, in the hands of intelligent apiarians, they can be made to render equally valuable service. The advantages already derived from them, amply justify the zeal and energy which the German beekeepers displayed to introduce and disseminate the race. It is a noble employment, even in the narrowest sphere, to labor for the attainment of truth, and the exposure of error.

☞ In the district of Altmark, in the province of Brandenburg, the hives in common use are made of straw, with the entrance for the bees placed invariably about three inches from the top. It is three inches long and half an inch high. Bees are said to winter extremely well in these hives.

To secure early and strong swarms, as the chief elements of success, the beekeepers there feed their colonies moderately, every evening, with diluted honey. They commence this feeding early in the season, and continue it till the fruit trees begin to blossom, and then use undiluted honey till the blossoms drop.

Mr. A. Braun ascertained by careful weighing that one of his colonies lost ¾ oz. in weight daily, from the first of October to the fifth of of February; and that the daily loss from the fifth of February to the thirty-first of March was three ounces. During the former period there was very little brood in the hive; during the latter, there was a considerable amount of it. It is thus made manifest that the brood required a large quantity of honey—especially when we consider that the weight of the brood is not here taken into account.

Mr. Hoffman, of Vienna, mentions that on stupefying bees with ether, nearly one half of the whole number never revived. And Mr. Gabanz states that when etherizing a hive the entire population deserted it, though it contained much brood and ample supplies of honey. In an experiment made by me some years ago, to test the effect of ether where the bees were allowed free egress, they rushed out in clouds almost instantaneously, and the whole of them could, no doubt, have been expelled in a very short time. U. Y

HONEY IN CUBA.

There are in the island of Cuba, 12,500 apiaries, distributed in suitable localities. These furnish annually 20,000 cwt. of wax for export to Mexico alone, besides the enormous quantity of honey sent to Europe and the United States. The business is conducted on a very extensive scale, but in a primitive, rude, and slovenly manner. Vast as are its products, it still falls far short of what it might be made to yield. The quantity of honey produced might be immensely increased, and its quality greatly improved.

☞ A swarm just hived should never be placed at the side of a strong colony that has not yet swarmed, because if the weather on the next ensuing days be fine, the bees of the old stock will issue in great numbers, about noon, and disport in front of their hive. The bees of the swarm not having yet become well accustomed to their new location, will, on their return, be attracted by the busy, joyful hum of their neighbors, and tempted to join them. A loss of bees from this cause, at a time when no brood is maturing in its hive, is a very serious injury to a young swarm.

☞ In Denmark, where bee-culture was for a long time greatly neglected, there were, according to an official report, 86,036 hives of bees in the year 1858. This would average for the whole country only one colony to every 100 acres, or six to the square mile. The net exports in 1846, were 41,866 lbs. of wax, 137,077 lbs. of honey, and 28,053 gallons of mead. The annual product of the country is estimated at 184,150 lbs. of wax, 1,630,860 lbs. of honey, and 35,828 gallons of mead. This is supposed to be a low estimate.

☞ Even strong and healthy colonies may be attacked by robbing-bees and overpowered, if the hives are so placed as to be exposed to the direct rays of the sun on a hot day, and bees from another apiary have to fly over them on their way to and return from a locust or linden grove, or buckwheat field, or an orchard, when either of these is in bloom.

☞ The incipient enlargement of a *pollen* cell, as preparatory to its conversion into a royal cell, is an infallible evidence of the queenless condition of a colony.

☞ The Favignasese have a saying, that honey is the drink, pollen the meat, and water the medicine of the bees.

AMERICAN BEE JOURNAL.

Philadelphia, February, 1861.

TO CORRESPONDENTS.

All who are interested in the subject of Bee Culture, are respectfully requested to contribute to our columns. Communications to insure insertion, should be sent in by the first of the month at the latest, and as much earlier as possible.

Address them to A. M. SPANGLER & Co., Publishers, "AMERICAN BEE JOURNAL," No. 25 North Sixth Street, Philadelphia.

A number of communications intended for this number have been received. We give place to several—all we could find space for. The others will appear in our next.

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Will our Editorial brethren who receive this number of the "Bee Journal," do us the favor to notice its advent, and at the same time open an exchange with the Bee Journal? We shall take pleasure in reciprocating the favor in any way in our power.

OUR PROSPECTS.

We are certainly under deep obligations to our friends in every part of the country, for the exceedingly kind manner in which they have received our first number. Our mails are crowded with complimentary letters, and the responses to our request to furnish the names of beekeepers, have been all we could expect or desire. Our subscription list marks a most healthy rise, and in fact, the future of the "BEE JOURNAL" is promising in every particular. What shall we say to all this? We can only return our sincere thanks to the friends who have so kindly aided in pushing forward our enterprise; hoping to repay them in a small degree, by rendering the Bee Journal interesting and valuable. May we not trust that this feeling of interest will continue, and that we shall be sustained? We have not a doubt of it, and we will leave nothing undone which will in any degree tend to merit a continuance of the valuable assistance already extended us by the friends of bee culture.

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THANKS.

We herewith tender our most hearty thanks to our Editorial brethren everywhere, for the exceedingly kind manner in which they have noticed the advent of the "American Bee Journal." It will be impossible to reciprocate these favors as we could desire. Will our brethren take the will for the deed?

PRINTING.

We are prepared to execute orders for Plain and Fancy Book and Job Printing, at short notice, in good style, and on reasonable terms. We give special attention to Catalogues, Pamphlets, &c. Those who desire good work, at low rates, are requested to call and examine specimens.

CORRECTION.—In the slip which was sent with a number of copies of our Journal, the terms should be $1.00 instead of $1.50.

Monthly Management.

FEBRUARY.

With the increasing length of the days, the sun's influence becomes more and more perceptible in this month. All nature seems preparing to revive, and the bees chime in with the common impulse. Even in the more rigorous winters some brood will now be found in the combs, unless the colonies are weak and ill-supplied. Extensive brooding at this early period, however, is not desirable, and the beekeeper's endeavor should be to repress it as much as possible, because generally it does more harm than good. When bees have brood to nurse, they are impelled to venture forth more frequently and in larger numbers, and many more are lost from stress of weather or sudden changes, than can be replaced by the maturing brood. The stores of honey and pollen are also rapidly diminished to supply the wants of the larvæ; and hence, in the most favorable event, the resulting advantage is of small account. The stores required to nurture the young which barely serve to keep up the population, had better be reserved to sustain the old bees, if a late spring should follow. There is danger also that an old queen, prematurely urged to lay eggs, may die from exhaustion at a time when, from the want of drones, her place cannot be supplied, and the colony be ruined in consequence. He that would carry his stocks through the winter cheaply, safely, and in good health, must strive to keep his bees in perfect repose as long as possible. The more quiet they can be kept, the more their hives are shielded from the sun's rays, and the less they are allowed to feel the approach of spring, the less honey will they consume, and the better will they be able to bear confinement. But it is not always practicable to accomplish this, where bees are wintered on their summer stands; and if a fine mild day occurs in this month, it is well to give them an opportunity to fly, that they may discharge their fœces. Then screen the hives again from the sun, till the winter is fairly over. Stocks which are wintered in a vault or dark chamber should not now be brought out, unless the bees appear restless, because when they have once flown they are apt to commence brooding if replaced in the depository, and it is then difficult to keep them in repose—being instinctively inclined to roam abroad when they have larvæ to nurse.

If the ground is covered with snow when the bees are thus allowed to fly, some loose straw or hay should be scattered over it, in front of the hives, to prevent such as fall from becoming chilled.

If colonies are to be removed to new locations in the apiary, this had better be done before they are allowed to fly. Though the bees do not all forget their old location, even after four months' confinement, they readily at this season accustom themselves to a new one, if they can make their first excursion on a fine, clear, mild day, which permits them to issue in masses. The general joyful humming which then ensues, serves as a mutual attraction to keep them together, and designates the position of their new home. Offering them a little diluted honey and closing the entrance for a few minutes when they begin to issue, will rapidly increase the excitement, and cause them to rush out with redoubled animation.

If the weather be sufficiently mild to allow the bees to fly, movable comb hives may now be opened, to inspect the state of the stores. Should additional supplies appear to be needed, some frames containing honey in sealed combs may be inserted, which is the best and easiest mode of providing for the wants of a colony. But if no such combs are at hand, sticks of candy laid on the frames, or pushed down between them among the bees, are the best substitute. Even in colonies well supplied with stores, frames with sealed honey may now be advantageously removed from the sides of the hives, and placed nearer the clustered bees, so as to be more readily accessible if cold weather ensue.

If hives are to be removed to a distance, it is best to defer it till the bees have had an opportunity to discharge their excrements. The sooner thereafter the removal is effected the better, because it is always attended with less trouble and risk when there is not much brood in the combs, and no new comb has yet been built.

Colonies which have brood require water, and many bees are lost on their excursions to procure it. It should, therefore, be furnished to them in some sheltered nook convenient to the apiary, or poured in some old comb and placed in the hive. If they have much brood, they will consume honey rapidly, and need looking after occasionally, that their wants may be seasonably supplied.

ADVERTISEMENTS.

We are prepared to give room to a limited number of advertisements, at fair rates; but we shall in no case intrude them upon the space now set apart for reading matter. As we are printing large editions, it furnishes a most desirable medium for bringing matters interesting to a large number of our readers, prominently forward. Advertisements should be forwarded to us on or before the 20th of the month. For terms, see second page of cover.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. III.

Having fully considered the only objection urged against the first proposition, and, as I conceive, finally disposed of the *black bees*, I shall now proceed to discuss the second—arranging it, for greater convenience, under several distinct heads. The second proposition reads thus:

2. In the normal condition of a colony, the queen is the only perfect female present in the hive, and lays all the eggs found therein. These eggs are male and female. From the former proceed the drones; from the latter, if laid in narrow cells, proceed the workers or undeveloped females; and from them also, if laid in wider acorn-shaped and vertically suspended, so-called royal cells, lavishly supplied with a peculiar pabulum or jelly, proceed the queens.

1. *In the normal condition of a colony, the queen is the only perfect female present.*

This will commonly be conceded, even by those apiarians who believe that, in the normal condition of a colony, the drone-eggs are laid by a distinct class of bees, which they call *drone-mothers*. They cannot, however, do so consistently. For if the queen can lay worker-eggs only, and the conjectural drone-mothers lay drone-eggs only, it is not very clear how the queen can be regarded as, in any respect, a more perfectly developed female than those hypothetical drone-mothers. But we need not now discuss this point, because it will incidentally be disposed of when we prove, as we presently shall, that the queen lays the drone-eggs also.

Nor need we do more than advert to the novel notion recently broached by a correspondent of the Bienenzeitung, who reconverts the queen into a male—the only one in the colony—and places this male, like the Padisha at Stamboul, on a throne in a seraglio! Though we have hundreds of times seen the queen lay eggs, frequently in our own hands, we have never yet seen a rooster lay any, except boiled ones at Easter, when the children pommelled his tail to test his fertility!

2. *In the normal condition of a colony, the queen lays all the eggs found therein.*

Since no one now-a-days denies that the queen regularly and exclusively lays all the eggs from which workers and queens are produced, the only question remaining is whether, in the normal condition of a colony, the queen lays the drone-eggs also. Though Dzierzon alleges that he has seen her do so more than fifty times, still the fact is not conceded by all; and many of the ablest apiarians continue to controvert the doctrine. We long labored under delusion ourselves in this particular, but publicly recanted the error in the Bienenzeitung, No. 8, 1852, when communicating the results of experiments expressly made to ascertain the truth, and which demonstrated the correctness of Dzierzon's position. We will here briefly recapitulate the statements then made:

"*Experiment 1st.*—On the 12th of June, I caught the queen of a colony which contained both worker and drone-brood, and confined her in a cage, which I suspended in the hive among the bees. On the 8th of July, I took out all the combs, brushed off the bees, and examined every cell minutely with a lens, satisfying myself that there was not a single egg to be found. I then reinserted the combs and released the queen. On the 20th of July, I saw worker-brood, and on the 23d, drone-brood, in the cells.

"*Experiment 2d.*—Simultaneously on the 12th of June, I removed the queen of a second colony. On the 21st I took out all the combs and destroyed the royal cells which had been built. On the 8th of July, neither worker nor drone-brood was to be found in any of the cells. On the 31st the combs contained a large amount of drone-brood, namely, 175 larvæ in worker cells, some of which were capped, and 54 in drone-cells. The unhatched eggs I did not count.

"*Experiment 3d.*—I now divided the bees of this second colony, into three nearly equal portions, transferred each into an observing hive furnished with a single empty comb, and carried them to a mill two miles distant from my apiary. This was done on the 31st of July, at 3, P. M. I and my servant, Günther, an enthusiastic apiarian and fearless operator, now undertook to watch them alternately. At 5 o'clock, the bees had deserted two of the hives, and joined their late companions in the third, covering the comb so densely that no observations could be made. Next morning we removed the out-lying bees, and caught and confined all that issued, till the population was so reduced that the cells of the combs could conveniently be inspected. Nine eggs could now be seen in five cells. We continued to watch by turns all day, without detecting any bee in the act of laying. At nightfall, we placed the hive on a table in an arbor, and continued our observations by lamplight. A few minutes before one o'clock, Günther exclaimed, "now there is one laying!" I instantly lifted out the comb, and Günther transfixed the bee with a needle, as she was withdrawing her abdomen from the cell, in which I inserted a pin in order to mark the spot. Günther now drew out the transfixed bee, and on examining the cell, each of us saw the egg it contained. We then replaced the comb and closed the hive. About an hour later, while we were engaged in conversation, a bee suddenly flew into the flame of the lamp, and I directed Günther to carry the hive out of the arbor. On approaching it, he remarked that the bees were coursing over its exterior in great commotion, evidently in search of a queen. They continued to do so all night, showing that these bees, which had actually beeu queenless since the 12th of June, were now first really conscious of their destitution; for they deported themselves precisely like bees which have just discovered that they have lost their queen—uttering faintly the usual plaintive moan.

"At 9 o'clock next morning, we transferred the bees to another observing hive, furnished with a comb certainly containing no eggs. My object was to ascertain whether egg-laying would still be continued. At six o'clock in the evening, I found the hive deserted by all the bees except three; and not an egg had been laid.

"The egg-laying bee thus caught *flagranti delicto*, was precisely similar in size, color, and appearance, to a common worker; no difference whatever was perceptible.

"The results of these experiments, remarkable as they are, speak decidedly in favor of Dzierzon's theory, and as decidedly against the views hitherto entertained and defended by Mr. Braun and myself."

We will merely add now to what was then stated, that last summer we saw the queen of an undoubtedly normal colony, lay eggs in drone-cells, as we shall relate more in detail when we come to consider the third proposition. We must regard all further discussion of this point as superfluous, till the opponents of the doctrine produce new evidence in support of their views, or new arguments to sustain them.

Mr. Kaden, indeed, does advance somethiug *new*, inasmuch as, when questioning the conclusiveness of these experiments, he contends that the confinement of a *fertile* queen and the consequent cessation of egg-laying, are not demonstrative evidence that the drone-eggs were laid by the queen, because the confinement of the queen produces a disturbance in the order and economy of the colony, without yet placing it in the condition of actual queenlessness. This *disturbance* (we may surely be permitted to carry out Mr. Kaden's argument,) causes the drone-mothers to cease laying. Now, if this be not an *argumentum desperatum*, there never can be any. By the removal of a queen, a colony is at once placed in a condition of queenlessness; and why the drone-mothers, which are supposed to labor so beautifully in their vocation while the queen is present, should suddenly cease laying when she is merely put in duress in the hive, we are utterly unable to comprehend. What are those drone-mothers, thus suddenly *disturbed*, to do with the eggs which have matured and are now ready to be deposited? Shall they let them drop? Aye! But, to ascertain whether they do drop them, Mr. Kaden should drum out a colony while drone-eggs are laid, remove the queen, place the bees in an empty hive, and set this on a black-board. Eggs ought then to patter down like hail! Or, he might transfer the bees to a hive furnished with empty drone-combs, in the hope of finding the cells, two or three days after, thoroughly supplied with eggs. Whereas, joking apart, *he would not find a single egg in either case.*

Let Mr. Kader clip the wings of an unfecunda-

ted queen, and four weeks after examine the hive for drone-brood. Possibly he may find none; but if perchance some be discovered in a few cells, let him then transfer the entire community—queen and workers—into an observing hive, and watch them carefully. We can assure him that he will then soon see the queen lay. He may thus not only satisfy himself of the untenableness of his doctrine that "drone-mothers are regular members of every colony;" but at the same time become convinced that there are queens which, though unfecundated, are able to lay eggs from which living drones can be developed.

Though many apiarians deny generally that, in the normal condition of a colony, the queen ever lays drone-eggs, yet some among them admit that exceptional cases occur when, as in drone-breeding colonies, the queen lays the eggs from which the drones proceed. Others, however, go so far as to assert that, at no time and under no circumstances, can a queen lay drone-eggs. It must be acknowledged that the latter reason more consistently than the former, though they are, in fact, involved in an equally gross error. Instead of relying on sheer *a priori* reasoning, these should take some drone-breeding colony in which eggs are laid with regularity, cell after cell, and in worker cells especially, drum out the bees, and transfer them to an observing hive furnished with empty combs. They will then speedily see, what we and others have often seen, a queen laying drone-eggs, or eggs from which drones will in due time be hatched. Such experiments, however, demand patient observation, and a degree of tact and skill which all do not possess, and which, it would seem, are more difficult to acquire than the art of composing fanciful treatises on bee culture.

3. *The eggs in a normal colony are male and female. From the former proceed the drones. From the latter, if laid in narrow cells, proceed the workers or undeveloped females.*

Against this portion of the proposition, three objections are urged.

A. It is denied by some, that the eggs from which the drones are developed are male, inasmuch as they contend that the drones themselves are not males. This objection will be thoroughly refuted when we come to speak of the fecundation of the queen.

B. Those who advocate the doctrine that special *drone-mothers* exist in every colony, are constrained to contend that imperfectly developed females do not proceed from all the eggs laid in worker-cells; but that some of those eggs produce females perfectly developed, alias drone-mothers. We may, for the present, pass over this objection also, because the doctrine of the regular occurrence of drone-egg-laying workers in every colony, has already been in part refuted, and will be thoroughly discussed and exploded in a subsequent article.

C. Dr. Magerstedt contends that the workers are not undeveloped females, but that the major portion of them are males, and the rest drone-mothers, or—consequently—fully developed females. We may here pass this objection likewise, because we shall have occasion to show in our fourth article, that in the absence of drones, no queen ever becomes *perfectly* fertile—that is, capable of laying *worker* eggs. This would unquestionably not be the case, if the males were to be found among the workers.

DELAYED FECUNDATION.

The Baron of Berlepsch, says:—"I have now conclusive evidence that, at least in exceptional cases, a queen can be normally fecundated, after the 21st day of her age, which is the longest term allowed by Huber. On the 26th of June an Italian queen emerged from her cell, and on the 23d of July she returned, for the first time, from an excursion, with marks of fecundation. On the morning of the 26th, I saw eggs in the worker-combs of her hive, and on the 15th of August, young Italian workers issued from the cells. Whether success in a case of such prolonged delay, is a mere and rare exception, I will not undertake to decide." It were desirable that those who have opportunity to "mark time," would report their observations, giving us "day date," whenever a case, not squaring exactly with what "the books tell us," comes under notice. There is hardly any rule without an exception, yet it would be satisfactory to know, if it can be ascertained, how great a range of deviation or irregularity nature allows herself to indulge in, in the case of the queen bee.

☞ The Ninth Annual Convention of German Beekeepers was held in the city of Hanover, early in September last. Four hundred and fifty members were in attendance, and the discussions, we are informed, were animated and interesting. We expect to receive a full report at an early day.

The Tenth Annual Convention will be held next September, in the city of Gratz, the capital of Lower Styria. Count JOSEPH KOTTERLINSKY was chosen President, the Rev. ANTHONY SEMLITSCH, Vice President, for the current year. Mr. Andrew Schmid, of Eichstädt, is the stated clerk.

☞ Our friends are requested to send us the names of beekeepers.

(For the "Bee Journal.")

Fertility of the Queen.

A few days since I purchased two bee books published in London the past year. The greater part of one is devoted to the Microscopical Anatomy of the bee, which is very good. The author has evidently used the microscope better than he has his own unaided eyes. From some passages, he is apparently afraid of the insect with which he would familiarize us. In the other book there is not a line which could justify the author in publishing it, and inflicting a loss of time and money upon the reader. There is no necessity, whatever, of importing such bee books—too many of this stamp are issued here. Both the above-mentioned books agree in one thing, viz: The fertility of the queen, which they limit at the *high* figure of 200 eggs a day. Some authors have estimated it at 1500 a day, a few place the limit at 3000 a day. Those unacquainted with bee life, will think it strange there should be so great a difference in the estimates of different men. The fact is, many have too high regard for *authorities*—too many writers are not practical men, or they are too lazy or too timid to investigate for themselves.

According to the size of the hive, the strength of the colony—the season, the number of swarms cast, the amount of stores accumulated, &c., you will find an amount of brood showing that during the past 21 days, (which is the period from the egg to the bee,) the queen has been laying at the rate of 50 or of 3000 eggs a day. The fertility of the queen is influenced by the strength of the colony, the size of the hive, the amount of stores accumulated, the state of harvest, and the temperature of the weather.

A hive is too small to permit the queen to develop her full fertility, if when filled with comb, there are not cells enough to contain all the eggs she can lay. The same condition practically exists in a large hive, when the comb is so filled with honey and bee-bread, that there are but few empty cells for the queen to deposit in. Hives that have cast several swarms in the season, are generally very weak in numbers, although they may possess plenty of stores, in fact "over-wealth." This condition is brought about as follows: After casting a swarm, the old hive remains for from eight to twenty or more days, without a *fertile* queen; in the meantime the workers are actively engaged in bringing in honey and pollen, and in filling vacant cells, which would be used for brood were they in possession of a fertile queen. This state of affairs, if repeated (by swarming) two or more times in a season, the cells remaining vacant are reduced to so small a number that it is impossible for the queen to exercise her remarkable reproductive power.

The number of eggs deposited by the queen, is limited to the strength of the colony. No more eggs will be laid than the workers can take care of; so it would be unfair to judge of the capacity of the queen from examination of a weak colony.

When the honey harvest fails, we notice the workers prudently commence killing off the drones, except in queenless stocks. Within the hive at at this time one observes less activity in breeding, and no more drone-brood. Where much buckwheat is raised, and fall bee-pasture abundant, you will observe many hives recommence raising drones, and a greatly increased activity in laying, and when the fall-pastnre is long-continued and abundant, some swarms will issue.

From the above we may conclude, that both the amount and kind of brood produced, depends upon abundant food.

If engaged in raising Italian queens, as many will be the coming season, you may make more sure of pure impregnation, by increasing your stock of Italian drones through feeding as early as possible in the season, and supplying them with drone-comb, and thus by artificially raising queens, getting them impregnated before the appearance of common drones.

Less brood is produced in cold weather—some springs are particularly unfavorable. Some years, on this account, breeding is so backward, that the honey harvest is nearly gone before hives are sufficiently powerful to take advantage of it.

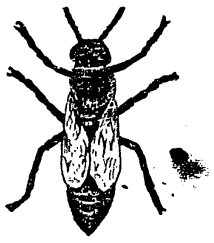
When all the conditions are favorable, the queen can deposit three thousand eggs a day. This remarkable fertility has been placed beyond doubt by several apiarians, who have taken the trouble, not only to estimate, but to count the cells occupied by brood.

I know I have very imperfectly followed out this subject. I hope from its interest, some more experienced person will do it justice in the "*Bee Journal*," and that, hereafter, no bee book will be published giving the productiveness of the queen at "200 eggs a day." E. P.

New-York.

☞Salt, slightly moistened with water and applied to the wound, has in many instances relieved the pain caused by the sting of a bee, and prevented swelling. But, like remedies for the toothache, it is not effectual in every case.

☞Eight good days will enable a strong colony to make up for eight bad weeks.



The Queen Bee.

This most important member of the busy commonwealth, has been appropriately called the *mother bee.* Laying all the eggs in the hive, she is truly the parent of the entire population, drones as well as workers. The ancients, indeed, having an imperfect knowledge of the internal economy of these communities, misnamed her *king*, conceiving it to be the office of so distinguished a personage, to regulate and govern the masses. This erroneous notion has perpetuated itself in various countries, even to our day; and we not unfrequently meet with beekeepers who receive it with implicit faith. Yet, whatever be the special opinions of some, the large majority of intelligent apiarians everywhere concur in assigning to her the character she can justly claim—that of being the common mother of the family. So long as she is present in the hive, all the eggs found therein are laid by her. The truth of this may readily be ascertained, by introducing an Italian queen among common bees. All the young subsequently hatched from her eggs, both workers and drones, will wear the livery of the foreign race; and the old stock will gradually disappear, none of their own "kith and kin" being thenceforward produced. It is thus rendered certain, that all the eggs originate with the queen.

But, as the cells in which the drones are bred differ in depth and diameter from those which cradle the workers, and drones are besides reared at certain seasons only, the queen must evidently possess the ability to distinguish between the two kinds of cells, and to lay male or female eggs at pleasure, according to the needs of the colony. That she has this ability is an undeniable fact, however difficult it may be to account for, or explain it. It baffled the ingenuity of numerous observers, till in 1845, Dzierzon submitted a hypothesis, which though at first derided, is now acknowledged to be correct, and sufficient to explain in the simplest manner, the mysterious phenomena which had so long perplexed the shrewdest inquirers. The essential part of this hypothesis is that in the egg, maturing in the ovary of the queen, sexuality is as yet undetermined—the germ being simply vitalized. The determination of sex is an after process. Among insects, the males occupy an altogether subordinate station, and for their production, fewer or less potential conditions are required, than for the production of females. Hence, in the case of the bee, nothing more is needed for the development of a male germ, than the same natural or maternal influence which sufficed to vitalize the egg, and this is rendered efficient *by* the passage of the egg through the oviduct. Whereas, for the development of a female germ, the co-operative influence of male sperm is indispensable; and this is effected *during* the passage of the egg through the oviduct. Accordingly, drones or males owe their existence exclusively to the queen or mother; the workers or females, on the other hand, owe theirs immediately to the queen, but mediately also to the drone by which she was fecundated. The feasibility of all this results from the further circumstance that, in the act of copulation, fertilization does not extend to the ovaries of the queen; for the million of eggs which a fertile queen may lay during her life, are not then, at most, more than inchoately present, if, indeed, they may be conceived of as even rudimentally existing at the time. And that which does not potentially, perhaps not even rudimentally exist, cannot be susceptible of fertilization. The fact, as ascertained by dissection, is simply thus. In copulation, a small sac or vesicle called the spermatheca, situated on the oviduct and connected with it, becomes charged with the male sperm, and constitutes the reservoir from which supplies are drawn as needed. Eggs which, in their passage through the oviduct, become impregnated with the male sperm, as they pass the mouth of the spermatheca, produce workers; and eggs not so impregnated on their passage, produce drones. This fully accounts for the apparent anomaly that certain queens, which were either restrained from copulation, or—having no spermatheca—were incapable of fecundation, or whose spermatheca has in time become exhausted, if they do lay eggs, lay such only as produce drones. A healthy fecundated queen can lay both worker and drone-eggs, at pleasure—the mere exertion or non-exertion of muscular action, sufficing to impregnate the egg during its passage through the oviduct, or suffering it to pass uninfluenced by male sperm.

It was objected to this hypothesis, that life could not originate without sexual concourse. Yet, in defiance of all *a priori* reasoning, the indubitable fact existed, that drones are produced where no such concourse occurred; and it was a fair inference, that whatever does actually occur must also be possible, whether we can explain it or not. The objection, however, had to be aban-

doned as no longer tenable, when it was ascertained that non-sexual generation unquestionably exists, as a regular mode of reproduction in various other classes of insects. Prof. Von Siebold has placed this beyond doubt, in his treatise on "*Parthenogenesis in Bees and Butterflies;*" so that much as they dislike the doctrine, as contravening long-cherished notions, the most distinguished physiologists now concede its truth. To what extent it may prevail among the lower orders of animals, is not yet known; but it has since been discovered, that it obtains also among numerous classes of plants.

From every female or worker-egg a perfect female or queen can be reared, if it be developed in a wider and longer vertically placed cell, supplied plentifully with the requisite jelly. It is not, however, indispensable that the egg should be originally deposited in such a cell. The bees can transform a common worker cell to a royal cell, even after the larva therein is several days old, by widening that portion not yet occupied by the larva, supplying it lavishly with jelly, and then lengthening it downwards.

It is remarkable, too, that the queen, though more fully developed than the worker, yet emerges from her cell three days sooner. She usually leaves the cell on the 17th day after the egg was laid, if hatched in what the Germans call a *pre-constructed* cell; but will issue from what they call a *post-constructed cell*, sometimes as early as on the 11th, though more commonly on the 12th day after the bees began to transform the worker cell in which the egg was hatched. If a populous colony be deprived of its queen, a swarm with a young queen, undoubtedly reared after the deprivation, will issue occasionally on the 13th, but more generally on the 14th day, counting from the day of removal. The queen usually leaves her cell on the day before the swarm issues; and if the swarm comes on the 12th day, it is manifest that the bees must have chosen for the royal embryo a larva six days old. Consequently the notion hitherto prevalent that queens can be reared only from larva not more than three or at most four days old, cannot be correct. We may rather assume as truth that any worker larva *is capable* of being developed as a queen, so long as the bees have not begun to cap the cell which contains it—though commonly younger larva are selected by them. If just prior to that time, the cell be widened, lengthened, and supplied with jelly, a perfect queen may still be reared, for the sexual organs are formed latest, and are certainly not fully developed till the larva assumes the nymph state.

When selecting a larva for the purpose of rearing a queen, the choice seems to be determined by the location of the cell. It must be so situated that it can be conveniently widened and extended downwards, without involving the destruction of brood; though, when absolutely necessary, brood situated in lower cells, will be sacrificed. Cells on or near the edges of the comb, or on the margin of interior passages, are usually preferred.

The royal cell is used only once for rearing a queen, the bees subsequently destroying it wholly or in part. Where a number of such cells have been constructed, and a mature queen emerges from one of them, the rest are demolished and the embryo queens cast out, if the colony does not contemplate swarming. In such cases the doomed cells are torn open at the side, and the chrysalis removed. A mature queen liberates herself by cutting around the base of the cap with her mandibles, and then emerging through the circular orifice thus formed at the apex of the cell. If we would preserve the supernumerary royal cells from destruction, they must be removed on or before the 10th day, or we may find on the 11th, that the bees have ejected the embryo queens and begun the work of demolition.

After a young queen has been successfully reared, it is still very uncertain whether she will become perfectly fertile. To become so, concourse with a drone is indispensably necessary, and for that purpose she usually leaves the hive on the third day after emerging from her cell. Most writers are of opinion that unless she be fecundated within three weeks from the time when she begins to make her excursions, she cannot produce worker-eggs. Recent observations, however, render it probable that the time is not in all cases so limited. Though the colony in which she was reared have no drones, she may still become fertile, if drones from other colonies are flying while she is on the wing. Drones and queens appear to be attracted to each other by the sounds produced by their wings, and the meeting sometimes takes place at a great distance from the hive to which the queen belongs. This is evident from the production of hybrid brood, in one instance in an apiary situated three miles distant from the nearest Italian stock.

After a queen has become fertile, she never leaves her hive, unless when accompanying a swarm. That this is so, may easily be ascertained by clipping her wings when she has begun to lay. She will thereafter always be found in her own proper hive; and as such a queen continues fertile during life, it is certain that she has no occasion to repeat her excursions. An Italian queen

fecundated by a common drone, produces during life either pure Italian or hybrid workers, and Italian drones exclusively—thus demonstrating that the male eggs are not impregnated. If from accident or disease, a queen loses her ability to lay worker-eggs, she never recovers it.

Queens are sometimes lost during their excursions, being exposed to numerous risks while absent from their hives. Occasionally also they are attacked and killed by their own bees on their return, having probably contracted an offensive odor while absent, which causes them to mistake her for a stranger. This, however, is an exceedingly rare occurrence. Dzierzon says it has happened only twice to his knowledge, in his apiary. They are more frequently killed when entering some other hive by mistake, on their return from nuptial excursions. This is apt to happen when the hives in an apiary are very similar in size, shape and appearance, and stand close together. A young queen may likewise have her wings injured in a conflict with a rival, so as to be unable to fly, and will then be lost when leaving the hive to meet the drones. In such case the colony will inevitably be ruined, unless its condition be seasonably discovered and its wants supplied. It is therefore a useful precaution to furnish every colony, which has an unfecundated queen, with a comb containing eggs and larvæ, that they may have within reach the means of providing a successor, if the queen be lost. Such a colony will exhibit greater industry than one not so supplied, and the young queen will make her excursion earlier than she otherwise would, because there is a higher degree of temperature maintained in the hive. As the queen will always commence laying in the empty cells of the brood-comb thus inserted, it should be placed in that part of the hive where it is desired to have the principal brooding quarter. The lower and hinder part of the hive are the preferable place, because the upper and anterior portions will then be reserved for storage-room. It is also advantageous to select a comb having brood only in the lower ranges of cells.

To ascertain whether a queen which has not begun to lay, has made unsuccessful excursions, catch her and allow her to fly ten or twelve feet in front of her hive. She will immediately return to it, if she was ever out before. An old queen which made her excursion from some other locality will not return to the hive, but seek her home elsewhere—which shows conclusively that queens never leave after having become fertile.

There is a great difference in the degree of fertility exhibited by queens, some being much more productive than others. This results from the more or less complete development of the body, and the condition of the limbs—especially of the feet. A lame queen is slow, timid and cautious in her movements, hesitates to pass from one comb to another, and reluctantly approaches the edges of the combs. Thus the cells are irregularly supplied, and brooding is repressed. Those queens are best which deposit eggs in a regular and uniform manner, supplying cell after cell, without leaving vacancies. The brood will then mature at nearly the same time, and the queen can resupply the combs without wasting time in search of empty cells. Such queens should be preserved as long as they remain healthy and vigorous; and such as are, in this respect, irregular in their habits should be discarded without delay. The population of a colony and its productiveness depend greatly on the fertility of the queen, and the habit she has of dispatching business methodically.

Fertile as the queens of common bees are known to be, they are yet greatly surpassed by their Italian rivals. Of two colonies equally populous in the spring, the Italian will increase much the more rapidly; and by its remarkable and indefatigable industry, will also surpass it in the accumulation of stores.

It is an interesting question how many eggs a queen may lay in a given time, under favorable circumstances. Dzierzon estimates the number of eggs laid by a vigorous queen, during the swarming season, at three thousand per day, if the colony be populous enough to cover the combs properly. This is certainly not incredible, as queens have been known to lay from 200 to 300 in an hour. Kirsten limits the number at two hundred per day, at the most favorable season. But, as eggs are hatched and the brood fully matured in twenty-one days, if this were correct there could never be more than 4200 cells occupied by eggs and brood. These could be amply accommodated in a single comb, nine inches square—whereas we not unfrequently find a dozen such combs in a hive filled with brood, at one and the same time. On the whole we may confidently assume that a vigorous queen may annually lay from 250,000 to 300,000 eggs, or at least 1,000,000 in the four years which constitutes the average duration of a queen's life. Many of these eggs, indeed, may not be hatched or become fully developed, as the workers are apt to destroy brood, especially when pasturage fails, or the weather proves unfavorable.

It is of the utmost importance in practical bee culture, that the apiarian should possess full and accurate knowledge of the nature and functions of the queen, as the most interesting inmate of

the hive. He should know how she is produced, how fecundated, what are her habits, how she influences and is influenced by the workers, and how differently these treat her before and after she becomes fertile. He who lacks this knowledge will be liable to make many mistakes, whether he relies on natural swarming, or resorts to artificial processes, for the increase of his stock. Thus for instance, if a first swarm from one hive and a second swarm from another, happen to issue at the same time and unite, he must know which of the two queens should be preserved and given to the united stock, if contests among the bees and consequent queenlessness are to be prevented. Again, when an artificial colony is started and an unfecundated queen is given to it, the result will in ninety-nine cases out of a hundred be a failure. The workers, accustomed to the presence of a fertile queen, have little regard for and no attachment to one which does not lay eggs, and will most generally destroy her if free, or cripple her if confined in a cage. Bees will accept an unfecundated queen only after they have for some time been conscious of their queenless condition, and then receive her reluctantly, for want of a better. Under such circumstances artificial colonies would succeed only, if the workers be taken from a colony deprived of its queen, and which has already built royal cells; or from one which sent forth a swarm a few days before.

[From the Rural New-Yorker.]

A PROFITABLE APIARY.

We find, from time to time, in many of our agricultural journals, large and sometimes incredulous accounts in regard to the *profits* of bee culture; and hence it seems to be necessary to furnish proper testimony when such information is given, that it may be received as reliable.

To do this, I would say, without further preliminary remarks, that the apiary of which I am about to state a few astonishing facts, is in the town of Alabama, Genesee County, New York, and is owned by CHAUNCEY S. HARRINGTON, whose P. O. address is Akron, Erie County, in this State, and who will cheerfully verify the following statements, if necessary:

Mr. H. had, in the spring of 1859, five stocks of bees, in the "Weeks' Hive," which is provided with a surplus honey chamber holding two boxes, and will, when full, contain about 25 lbs. These stocks, that season, gave five swarms, which were saved; four put into the Langstroth movable cone hives, and the other into the Weeks' hive. All of these wintered well, so that last spring, 1860, Mr. H. had ten good stocks. How much surplus honey Mr. H. had last season I am unable to say—he had quite a quantity, however. The *increase*, it will be obvious, was quite ordinary.

The ten stocks this season, 1860, gave seventeen swarms, which were saved. All, with the exception of six, were put into the "Langstroth Hives." Mr. H. has, this season, taken off from the hives of ten stocks and seventeen swarms, 836 pounds of surplus honey, the principal part of which was disposed of by contract, at 14 cents per pound.

836 pounds surplus honey, at 14 cents per pound,	$117 04
17 swarms, exclusive of hive, at $5.00 each, . . .	85 00
Profits of the ten old stocks, . .	$202 04

Or, $20 50-100 per stock! The Weeks' hives—8 in number—gave 213 pounds of surplus honey; nearly 27 pounds each. The Langstroth hives—13 in number—gave 623 pounds of surplus honey; nearly 48 pounds each. It will also be observed that only 21 colonies produced surplus honey; 21 colonies, 836 pounds honey—nearly 40 pounds each.

I presume that some one is now ready to make inquiries:—"Have these colonies honey enough to winter them with safety? Have these colonies been fed?" In reply to these inquiries, I would say that I visited Mr. H. and his apiary a few weeks since, for the express purpose of ascertaining these points. Mr. H. and myself examined each colony thoroughly, and estimated that the colonies would *average* at least 30 pounds of honey, nearly every frame being filled with comb and honey. As 25 pounds is generally sufficient to winter a colony of bees, even in an exposed situation, there will be no danger of losing any bees for want of food. There seems to be but little difference in the weight of each colony in the Langstroth hives, as by means of the frames Mr. L. has been enabled pretty nearly to equalize their contents. Mr. H. informs me that the fields in his vicinity were literally covered with white clover, which secreted an abundance of honey nearly the whole season, thereby affording to his bees extraordinary facilities for laying up large and almost fabulous stores of honey. Mr. L. says that no honey nor liquid of any kind was fed to his bees. Were it not that I apprehend some of the foregoing statements may, by some, be discredited, I would give the profits of one or two of his best colonies. It may, perhaps, be the better way, all things considered, to let what has been said suffice.

In conclusion, let me remark, that the foregoing statements in reference to the honey, were condensed from a memorandum which Mr. H. keeps expressly for the purpose of knowing the exact profit of each colony.

M. M. BALDRIDGE.

Middleport, Niagara Co., N. Y., Dec. 4, 1860.

☞ In Carniola, bees swarm early and very frequently, in favorable years. In the apiary of of the Rev. Mr. Zhuder, of Sava, a swarm issued on the 30th of March, 1847, from one of his hives, and another from a different hive on the 1st April. In the same year, Mr. Zhuffer, of Dani, had ten swarms that year, as the increase of one hive. The parent hive swarmed six times, and the first and second swarms sent forth two each. He obtained ninety-four good swarms from thirteen old stocks.

☞ Please send us names of beekeepers.

[For the "Bee Journal."]

Suggestions.

Before the season opens it may be for the mutual benefit of beekeepers, if those who have met with difficulties in the manipulation of hives, will suggest a remedy. Sometimes this can, no doubt, be answered at once, by those who have had large experience. If not answered, and the remedy seems feasible, then many might try it, and report through the Journal.

For instance, *to keep frames firm.* It is desirable that the frames in a movable comb hive should be arranged and kept firm in their places. The writer has adopted, for want of a better, the following plan.

An *inch* tack is driven *half-way* into the edge of the perpendicular end of each frame, also into the edge of the top of the frame, (one at each end,) so that one frame cannot approach another within one-half inch; in fact, when a frame is laid down on one of its sides, it stands on four legs. The two outside frames have a perpendicular division in the centre, and on this division is tacked a square inch of sheet-lead. Now, when all the frames are in the hive, a screw is entered from the *outside* of the hive, so that the end of said screw shall strike against this bit of lead. It is easily seen that a screw on the two opposite sides may be turned far enough to press the frames together, and thus a hive may be turned over, and they will not move. Omit the tacks on the outside edge of the outside frames, and you will have room enough after the screw is loosened to push the comb aside, to make room for the removal of a comb. It may be said that the tacks will interfere with the removal of a comb. The top ones will not certainly, and the writer has not found any difficulty in the tacks half way down the sides. A little comb may project over, but the head of the nail scrapes its way without any damage. But avoid, by all means, placing a tack on the *lower* part of the frame, as when removed, the head of the nail would pass over the face of the comb, and nine times in ten, break the caps off the cells.

Another suggestion is

Will Bees build Comb over Paint?

Some author has said they will not. If true, then frames can be painted on the edges and under, side, which will make the removal of combs much easier. Will some one try it and report?

Honey Boards.

The writer has made use of a top to his hives which thus far has worked well. The difficulty is in describing it, so as to be intelligible. Suppose the board is twenty inches long and fourteen wide; it is clamped at the ends. Let the clamps be fourteen inches long; but the other part is in three pieces; the main piece is, say eleven inches wide. Upon *the ends of this piece* nail or groove on the clamps; thus the ends of the clamps will project over on each side one and a half inches. Make two other pieces *one inch* wide, and long enough to have a tongue on each end, which shall slide in grooves cut out on the inside of the clamps. (If the clamps are grooved on to the main piece, then the grooves are already made, and this is the best way.)

Now, when these pieces are put in place, and pushed in close, you have a honey board so that no bees can pass out when put on the hive. It is not as wide as the hive, however, by half an inch on each side; and the clamps project over that much. Suppose now you wish to put on surplus boxes, you can insert a knife and push out the pieces flush with the outside of the hive, and then there is an opening the whole length half an inch wide, and as the bees go up on the inside of the hive without going over a comb, they can avoid a crowd, and pass directly in the boxes, which of course have a corresponding opening in the bottom. The advantage found from this arrangement has been that, where drone-comb is put on the top to be filled, the width of the opening in the top can be lessened to 5-32ds of an inch, and the queen prevented from depositing drone-eggs, which she may do especially when (as in my case) very little drone comb is left in the main hive. With one exception drones are nuisances, and a half frame of comb is enough for them. Catch one of them coming out of a hive and he has a belly *full* of honey, but catch one coming back and he is empty —has digested all he had and apparently comes back for more.

I will conclude by asking those who have not read Mr. Quinby's "*Appendix*," to send for one, (its cost is, I believe, 10 cents.) It is not only valuable in itself, but it is worth much more than than its cost, if only to show how an upright, straight-forward Apiarian can gracefully acknowledge an improvement, (that of movable combs) when it is made plain to his senses by practical experiment.

I have yet to see the man who is more reliable than Mr. Quinby; and any one who has read his book and noted the carefulness of his statements in all that pertains to beekeeping, will feel disposed to place a high estimate upon his opinion in favor of Rev. Mr. Langstroth's (Eclectic?) hive.

Whitemarsh, Jan., 1861. APIS.

☞Please send us the names of beekeepers.

[For the "Bee Journal."]

Diseases of Bees.

Our object in placing before the readers of the Bee Journal, the following, drawn from H. Hamet, with a few remarks of our own, is as much to elicit, as to impart information. So far, we have had very little experience in diseases of bees, and desire to increase our knowledge from the experience of others.

H. Hamet remarks: "Bees, like other creatures, are subject to various diseases. Less, however, than some animals, on account of their activity, industry and frugality, and they do not create for themselves any artificial wants. Their troubles mostly come from the want of care, and ignorance of their owners. Colonies in a wild state are more free from disease.

"The most dreaded diseases are dysentery, constipation, and foul-brood.

"DYSENTERY. In a normal condition, bees never void their excrement in the hive, they always go out for this purpose. This affection is generally noticed at the end of winter, when they have been retained prisoners in the hive for one or two months, by cold or rain. In this condition, they have no regard for the clothes of those passing near them, nor for linen spread on the grass to dry, close to the hive. If the air of the hive is rendered unwholesome by humidity, or any other cause, the bees, if confined, are soon attacked by dysentery. The interior of the hive, the combs, and many of the bees, are covered with filth. The air of the hive is offensive, and the colony perishes. No time is to be lost in giving aid to a hive sinking by this disease. Reverse the hive to get rid of the bad air. Cut out the filthy combs, and cleanse the hive as much as possible; allow them plenty of air, and feed them with a little good honey, slightly warmed. Some advise to add a little salt and wine to the honey. In such case, the salt is of no benefit; as to the wine, we advise the bee-keeper to drink it himself, so as to gain more strength to give his bees better care. He will then bear in mind that strong colonies, with sufficient stores and well-protected hives, are never attacked with dysentery. It only occurs in colonies lacking in stores; in those which have received in cold weather, inferior honey, or poor sugar-syrup containing too much water, which remaining unsealed, becomes sour and unwholesome; and in those colonies lodged in poor hives, badly sheltered, and in a damp place. This disease occurs in autumn, but chiefly at the close of winter."

We one year lost several hives from this cause, and attributed it to having fed them late in the autumn, on refined sugar too much watered; and the cells in which it was stored remaining unsealed, it soured. If the hives had been properly ventilated, much of the water would have evaporated, and the acidity prevented. Since that time we have not lost a hive from this cause, except one which was over-populous, and not having sufficient ventilation, they became restless from over-warmth in the spring, while the weather was still too cold for them to fly out. On examination, the hive contained plenty of honey where the dead bees were clustered, but the combs showed a want of ventilation; they were damp and mouldy, and very filthy. Mr. Hamet describes another disease which sometimes attacks weak colonies in poorly protected hives—CONSTIPATION; which he attributes to the distention of the abdomen by fœces, during very severe weather; the liquid portion becoming absorbed or evaporating, the bee cannot void the solid mass remaining. In this condition, they will not partake of food offered them, and a state of stupor supervening, they soon die. Hamet considers that both dysentery and constipation may become contagious in an apiary, if neglected until the air is affected by the odor of the diseased bees, and their excrements. This may possibly be true where the hives are kept in large numbers very near each other; but we are inclined to think, that the above conditions, and also foul-brood, are spread by bees robbing infected hives—the honey having been tainted by the bad odor of the hive. Honey made in a red cedar or a pine box, is impregnated with the odor of the wood. Honey stored in mouldy comb is very unpleasant in flavor, but we are not aware that it is injurious to bees. It certainly cannot benefit them.

We would be pleased to hear from the correspondents of the Bee Journal, on the matters so imperfectly treated in this article. Also, if any recent developments have been made in the cause and cure of foul-brood. E. P.

☞The bees introduced into Australia have multiplied rapidly and largely. They labor there almost the year round. The honey produced in the spring remains liquid; the winter honey is thick and of a doughy consistence at first, but speedily crystallizes. The quality of the honey is excellent, though differing according to the location of the apiary and the kind of pasturage. That gathered in the southern districts of the country is extolled as the best.

☞The bees cultivated in the northern districts of China, appear to be only a variety of the common kind, somewhat smaller in size.

The Italian Bee.

BY THE REV. GEORGE KLEINE.

(*Third Article.*)

It cannot be doubted that among the great number of persons engaged in bee culture, comparatively few will take pains to familiarize themselves thoroughly with the theory. The Italian bee would consequently never become extensively distributed in the country, if she could be used only in the interest of science—that is, if she did not likewise possess qualities decidedly important in the practical relations of the business. But, in this respect also, this new race promises to be a highly valuable acquisition. If she really possesses the excellencies ascribed to her; if it be not merely the charm of novelty that has engendered the enthusiasm evinced for the stranger, we may indeed indulge anticipations of most gratifying results.

But what are the good qualities claimed for the Italian bee, which entitle her to a preference, in practical bee culture, over the kind hitherto cultivated?

Capt. Baldenstein, who was simply a disinterested observer—never having reared any except for his own use—early remarked her superior productiveness; and Dzierzon, long before there was a demand for them, save for scientific purposes, found Capt. Baldenstein's observations confirmed by his own experience. His original colony arrived from Italy in the month of February, and on transferring it to one of his own hives on the day after its arrival, he found that two combs, each about eight inches square, were filled with brood in the various stages of development. The queen must therefore have laid on an average, about three hundred eggs per day, in the preceding three weeks, notwithstanding the unfavorable state of the weather at that early season, and the annoyances to which she must have been exposed during the transportation of the hive. In the course of the ensuing summer, moreover, he took from the original stock, combs containing more than sixty thousand cells filled with brood, to supply the numerous artificial colonies in which he was rearing queens, and the stock remained populous nevertheless—storing up an unusual quantity of honey. Mr. Hübler of Altenberg, at the close of May, took an Italian queen and twelve ounces of bees with a sealed comb of common brood, and established them as an independent colony. They multiplied so rapidly, that though he took from it a brood-comb subsequently, they still filled the main chamber of their hive with combs, and gathered sufficient stores for the winter. Similar evidences of the extraordinary fertility of the Italian queens have been furnished besides, in numerous other cases, so that their superiority in this respect cannot well be doubted—though possibly some portion of the striking difference may be attributable to the greater care and attention which the Italian stocks have received from their owners.

Another superiority claimed for the Italian bees, is their disposition to swarm early in the season. This point is fully conceded by Capt. Baldenstein, who says likewise, that the half-breed stocks inherit this disposition. I cannot myself venture to give an opinion, as I practise artificial multiplication exclusively in my apiary, and have therefore had no opportunity to institute a comparison. But if the queens commence ovipositing earlier, and are more fertile than common bees, it may be regarded as a fair inference, that the stocks would sooner be in a condition to send out natural swarms. If, however, their fertility, like that of the common kind, depends on or is governed by seasons and circumstances, the earlier or later issuing of swarms will be regulated accordingly. The matter is, moreover, of no special importance in practical bee culture, as the experienced apiarian knows how his bees should be treated, so as to subserve his purposes in this direction.

In our variable climate, where thousands of bees perish from the vicissitudes of the weather, it would be of greater practical importance if the Italian bee should prove to be more hardy than the common kind. Dzierzon remarked evidence of this trait in them, soon after he obtained his first colony. On the 12th and 13th of March, while the ground was still very generally covered with snow, he saw, with surprise, that they were busily carrying in pollen; and very few of those that dropped on the snow, became chilled. Though natives of a warmer climate, and therefore might be presumed more sensitive to cold, he thinks the apparent paradox of greater hardiness may be explained, by supposing that in their native land, where the mornings are cool and the nights are frequently cold, they instinctively labor early, because the nectar of the flowers is dissipated by the fervid heat of the day. He also carried Italian and common bees into a cold room, and found the former were still actively fluttering at the window, when the latter had already become benumbed. The Baron of Roschütz reports the same fact of the bees of Carniola—which are identical with the Italian—stating that they begin to work generally while the ground is still partially covered with snow, enduring the

frequent, sudden, and violent changes of weather with surprising immunity. Similar observations have been made by our peasants, who knew nothing more of the Italian bees, than that they were peculiarly marked. Thus one of them said to me recently, "the Italian bees must be hardier than mine, as I saw them on some early blossoms this spring, at a time when mine had not yet begun to work." The Baron of Berlepsch, however, expresses a doubt whether they are hardier, though he admits his inability to form a conclusive opinion, because there was no snow remaining on the ground when his bees began to fly. In the rough, cold weather of April and May, more of the Italians perished, because these ventured forth in defiance of the chilling blasts, while the common bees remained snugly esconsed in their hives—certainly no indication this, on the part of the latter, that they felt themselves to be constitutionally as hardy as the former. No one, surely, would expect them to be wholly insensible to cold; but the apprehension largely entertained that, as natives of a warmer country, they cannot stand this climate, may be dismissed as groundless, since they have safely passed through several very rigorous winters here.

Dzierzon thinks that their superior ability to endure cold, arises in part from their surprising activity and agility—peculiarities which the Baron of Berlepsch also concedes to them, and which he says they display most remarkably, when attacked by or attacking other bees

Connected with these traits is also their manifest superior courage. They are the boldest champions and bravest defenders of their hives. They are much more vigilant, and far less liable to be caught "napping," than our common bees. Every stranger, of whichever race, attempting to enter their hive, is at once repelled, or arrested and dispatched; and it is hardly conceivable that an Italian colony, having a queen, could ever be overpowered when attacked by our common bees. The frequent examination of my artificial colonies, which were necessary while I was rearing queens, often exposed them to most persevering assaults, but they invariably succeeded in beating off the assailants. I have no doubt that our common bees so frequently fail in successfully defending themselves, chiefly because they are not sufficiently alert and agile—qualities which the Italians, undoubtedly possess in an extraordinary degree. So completely have I satisfied myself of their courage and conduct when hostile demonstrations are made against them, that I never have the slightest misgiving as to the result. On the contrary, it has become one of my amusements to witnesss the conflicts, and observe how speedily the Italians achieve the victory. I no longer employ precautionary measures to prevent attacks, knowing them to be wholly superfluous. The testimony of Mr. Rothe is to the same effect. He had occasion to observe that a weak artificial colony, consisting of only about thirty workers with a fertile queen, long successfully resisted the attacks of a populous Italian colony, though it finally had to succumb. "Hercules himself must yield to odds." This noble trait can hardly be over-estimated, and it alone would unquestionably entitle the Italian bee to the palm of superiority. We might indeed infer from it, likewise, a greater propensity to rob—a quality not exactly of the most praiseworthy sort. But the propensity to rob is an heirloom in the entire family of bees, and the Italians may, perhaps, be entitled to claim a somewhat larger share of it. The Baron of Berlepsch says, they endeavor to force an entrance into every other hive; and another observer states, that wherever there is anything sweet to be licked up, the Italians are always sure to be first on hand. Mr. Rothe says—"with an eager yearning after honey, they are ever inclined to rob, and if there is anywhere within reach, a weak colony to be sacked, the Italians are certain to secure the lion's share of the spoil." Similar accounts have reached me from various other quarters, and I have myself had demonstrative evidence, both of their disposition and skill to appropriate the stores which others had faithfully garnered. But I have also found that all this is harmless, if the propensity be not fostered and aided by the mismanagement of the despoiled colony.

The disposition to rob results from an inordinate desire to accumulate stores of honey, and if displayed more strikingly by the Italian than by common bees, it manifestly presupposes in them a higher degree of industry—a trait, in fact, for which they are preeminently distinguished, and for which Capt. Baldenstein already awarded to them the highest praise. He found that, under precisely similar circumstances, his Italian stocks always secured more ample stores than his common hives, and could generally spare some surplus honey, when the latter had not even laid up enough for the winter. Dzierzon early noticed the decidedly superior industry of these bees, as he saw his newly-obtained colony carrying in pollen in March, while the ground was still covered with snow, and his common bees were inactive. Fearing that it might be stolen, he screwed the hive containing the strangers fast to its stand in his apiary, and so left it during the summer, transferring from it, from time to time, combs

containing worker and drone-brood, for the purpose of rearing queens. On the 23d of June, the drones were expelled, and all hope of further multiplying pure stock that season terminated. He now let the hive remain undisturbed, and the bees, for a considerable time, labored with the most remarkable industry. But gradually they relaxed their efforts, and when the buckwheat, sown on rye-stubble, came into blossom, they were clearly outrivalled by the common stocks and some late-made colonies. Still, as young bees continued to make their appearance, he felt assured that the hive was in a healthy condition. Late in the fall, when he undertook to remove it into winter quarters, he found it so heavy that he he could not lift it. The cause of their apparent remissness was now obvious. Having early rid themselves of a host of useless consumers by expelling the drones, they had in a short time filled all their combs with honey, and were thenceforward constrained to remain idle for want of storage room.

An apiarian friend wrote to Dzierzon—"I can now unhesitatingly recommend the Italian bees. Whilst during the past summer our common bees were comparatively indolent, the Italian were perseveringly busy, adding perceptibly to their stores from day to day; whereas the common stocks were constantly diminishing in weight. I frequently opened the hives and found that while the latter had stored up little or nothing, the former not only contained a good store of honey in capped combs, but also a large quantity freshly gathered in open cells. I could observe, too, that they visited many flowers to which I never saw common bees resort, and this fact helps to account for the surprising difference in the results."

In May, 1855, Mr. Hubler stocked the lower section of an observing hive with a small Italian colony, which they speedily filled with comb, storing every unoccupied cell with honey. He then gave them access to the upper section, placing an empty comb therein. In a few days this was stored with honey, and the bees ceased to labor for want of room. He removed the full comb and inserted an empty one, and the little colony immediately resumed work with their former zeal and industry. He had stocked a similar observing hive at the same time, with common bees, but these only filled the lower section.

In the Bienenzeitung, Mr. Rothe gives the following as the result of his observations on the superior industry of these bees: "On the 14th of September, 1854, I removed the queen of a second swarm, and introduced a young Italian queen in her stead, which produced a numerous progeny in the course of the fall. Early in the ensuing spring the remaining common bees disappeared. The colony, though at no time very populous, worked very industriously, and when the brooding apartment, containing 1920 cubic inches, was filled with honey and brood, the bees were allowed access to the honey chamber, containing 1200 cubic inches, which they likewise fully stored with honey. The supply in the brooding apartment was more than sufficient for their wants next winter. A half-breed colony, placed in a square box hive, containing 2730 cubic inches, filled it completely, and its weight is so great that I cannot lift it. On the 22d of June, I drummed out a swarm from an Italian hive, which by its industry soon worked itself into a good wintering condition. The parent hive and a hive of common bees were then interchanged, and I thus obtained two swarms of mixt bees from the former, each having a young Italian queen. After the second swarm issued, I transferred the parent hive to a new location, and set the swarm in its stead; both have done exceedingly well, the parent hive being now very heavy. I drummed out a swarm on the 17th of July, from another Italian hive, and removing the parent hive, set the swarm in its stead. The swarm gathered sufficient for the winter, and the parent stock has a large surplus to spare. This district is only moderately favorable to bee culture, and the larger number of my common stocks are rather poor. Hence, I cannot but regard it as a fact, that these comparative results have conclusively demonstrated the superior industry of the Italian bees." A year later, Mr. Rothe reiterated this opinion, as based on further observations, thus:—"That the Italian bees are more industrious than the common kind, is no longer doubted by any beekeeper who has had both kinds in his apiary. The present year, like the two preceding, was unfavorable to the bees, during the principal gathering season. My common stocks have very little honey to spare—some of them, indeed, have scarcely a supply adequate to their own wants, whilst all my Italian stocks have ample stores, and a large surplus."

In 1854, the Baron of Berlepsch stated that he was thoroughly convinced, from personal observation, of the superior industry and greater practical value of the Italian bees. In the fall, when the wasps attacked his grapes, the Italian bees followed in their wake, at once appropriating the juice of every punctured berry. If honey, or dissolved sugar, or any saccharine liquid, was left exposed, the Italian bees were sure to be attracted by it long before the common bees made the dis-

covery. Recurring to the subject in 1856, he stated that he had no opportunity that year to make comparative observations, but that in the apiary of his friend, Mr. Eberhard, the Italian bees had so greatly excelled the common kind in honey-gathering, that the fact of their superiority in this respect could no longer be called in question. At the Apiarian Convention in Güstrow he made a similar declaration, and reiterated it also at the Convention in Dresden, a year after—adding that when, early in the spring, a few flowers were expanded, the Italian bees never failed to visit them in search of nectar. But he appeared to apprehend that this good quality did not lead to corresponding results, because it seemed to him that their queens' fertility became exhausted sooner, and they were more disposed than common bees to produce drones in excess. Nevertheless, if their superior industry be conceded, the apiarian has it in his power to obviate the other disadvantages, by a seasonable renewal of the queens, and a judicious and careful suppression of drone-brood.

In addition to their admitted industry, the early expulsion of the drones has an important bearing on the productiveness of colonies. An early riddance of supernumerary consumers must exert an obvious influence on the preservation of stores, and enable the bees to enjoy the full benefit of their labors. The fact thus becomes of practical value to the beekeeper, as increasing his chances of success. The fact itself has, indeed, been questioned; but it has been so frequently observed, that it cannot well be longer held in doubt. Thus Mr. Saghy, of Hungary, says: "The most important advantage presented by the Italian bees, is the greater quantity of honey which they gather and store up. And according to my observations for three years, this advantage results mainly *from the earlier expulsion of the drones*, to which they are instinctively prone."

Another and highly important quality, in a practical point of view, possessed by the Italian bees, is their mild and tractable disposition. A dread of the bees' sting does undoubtedly, to a large extent, operate to the discouragement of bee culture. There are many timid persons, who are alarmed by the presence of the insect; and others, less sensitive indeed, still cannot approach a hive without painful apprehensions. Others again, though disregarding the momentary pain inflicted by the sting, suffer so much from the swelling which ensues, that they feel constrained to forego the pleasures of a pursuit which exposes them to such risks. These objections are, in a great measure, obviated by the introduction of the Italian bee, which is assuredly less irritable than the common kind. It certainly can and will sting, but generally does so only on provocation. In comparison with the common kind, they may justly be termed gentle and peaceable. Their animosity becomes excited only when they are accidentally annoyed, or intentionally irritated. In close, warm weather, or during great heat with abundant pasturage, when common bees are inclined to be very troublesome, we may unhesitatingly approach an Italian hive, or stand in front of it, without incurring the displeasure of its inmates. With due care and coolness, all necessary operations may likewise be performed with impunity. They sometimes threaten, though they seldom sting; whereas, with common bees it is usually a threat and a blow, though the blow comes first. The Baron of Roschutz bears the same testimony to their gentleness, and adds that he has never been stung. Though I cannot go to that extent, I must still concede that almost invariably, some act or movement of mine provoked the infliction.

True, this gentleness has been denied in some quarters, but the difference may have been produced by the treatment which the bees received; and there may be instances where an Italian colony proved to be excitable and refractory, without any apparent cause. These must be regarded as exceptional cases, especially since it has been ascertained that the same colonies in other hands and under different treatment, evinced no such irrascible disposition. Thus, at the Dresden Convention, Count Stosch stated that he once had an Italian colony in his apiary, which exhibited such an unamiable temper that he resolved to banish it. The queen was transferred to a colony in a distant apiary, where her progeny showed no symptoms of a pugnacious spirit, and the old colony, after rearing another queen, became as gentle and tractable as all his other Italian stocks were.

This mild and peaceful character of the Italian bee is now so generally acknowledged, that some have fancied it should be regarded as, on the whole, an objectionable trait. Even the Baron of Berlepsch conceives it to be problematical whether this gentleness is a recommendation, as he considers it desirable that mischievous boys and designing knaves, should be kept at a respectful distance by the dread of this insect's formidable weapon. He would rather submit to the infliction of a dozen stings daily, than be deprived of so efficient a protection for his hives. But to the great majority of beekeepers, the consequences of a sting are exceedingly unpleasant, and some have

been induced to abandon bee culture on that account alone. Hence Dzierzon has justly remarked: —"Though I disregard stings myself, it is very disagreeable to find our visitors occasionally annoyed and wounded by the bees, or to have one's neighbors complain of them as a nuisance, which the police should abate, to secure the safety of children. No such unpleasantness, and no such dangers, need be apprehended from the cultivation of the genuine Italian bee."

BEES IN CALIFORNIA.

The following is among the latest items of news from the land of gold:

THE BEE ANNOYANCE IN CALIFORNIA.—Since the extensive importation and production of bees in California, they have become, in many respects, a source of great annoyance. The housekeeper in cooking, the grocer and fruit-dealer, all have them swarming by hundreds, and perhaps thousands, around their premises, rivalling the housefly in troublesome propensities. A Sacramento coal-dealer recently obtained a quantity of coal which had a cask of molasses broken over it. When the coal was brought into the yard, the bees collected in such quantities that he spent half a day with a hose in washing off the coal in order to remove the temptation. They have partially destroyed the produce of several vineyards near Sacramento; when the grapes were gathered it was found that the little thieves had extracted the juice. As a matter of course, a large number of bees are necessarily destroyed while poaching on forbidden ground. Is there no remedy for these difficulties? asks the Sacramento *News*. Can bees be kept from annoying everybody but their owners, and at the same time preserve their own lives; or must the evils complained of continue to increase in magnitude?

This annoyance to housekeepers, grocers and and fruit dealers, results, we suspect, chiefly from carelessness and mismanagement, just as that from houseflies does, measurably, in every clime and country. In the latter case, cleanliness is found to be the most effectual corrective; and in the former, due care not to lead the poor bees into temptation will doubtless prove to be an efficient preventive. If the housekeepers will keep their luscious confections, the grocers their sugars, and the fruit dealers their sweetmeats, under due supervision and guard, the bees will cause them very little trouble—especially if, at the same time, they keep their tables, counters, and boxes fastidiously nice and unbedaubed.

Bees, like flies, make their annoying visits mainly on special invitation, and are very apt to retire as soon as they discover that no provision has been made for their entertainment. They are not fond of "short commons," and never linger long where there is not an odor of welcome. Nature has given them a *carte blanche* to appropriate whatever is sweet to the taste, and to interpret every well-flavored aroma as a loud call for their presence. They are not particularly abundant in these parts, yet a few months ago a worthy dame, residing within a furlong of our sanctum, undesignedly tempted them to visit her in countless multitudes. She had placed a pot of honey on her kitchen stove, to warm, but, being busy about other matters, the pot began to boil, and boiled over before she was aware. The overflowing honey ran down in streams on the stove, and thence ascended in fumes, filling the air with a sweet-smelling savor. The ever-watchful and wide-awake bees soon snuffed a treat in the "tainted breeze," and in a few minutes the kitchen was filled with these "winged worshippers" of sweetness, thronging in from all quarters—some even descending the chimney. Here was an "annoyance," with a vengence; and well might the good woman exclaim, with him of the Sacramento *News*, "is there no remedy for these difficulties?" The seething pot was forthwith snatched from the stove, by her husband, and hurriedly deposited in a dark corner of the cellar; the stove was promptly sponged with a wet mop, and when the grateful fumes ceased to exhale, the unwelcome visitors speedily decamped—save a few hundred that happened to get scorched in their eagerness. Like causes, we opine, will produce like effects, both here and in California, and if we allure bees, we must expect to have them buzzing around us—no matter whether we fumigate our kitchen with honey, or *anoint our stone-coal with molasses*!

As to the depredations alleged to have been perpetrated by our favorites in the "several vineyards near Sacramento," we ask to be allowed to hold them guiltless, till we have some more conclusive evidence than mere newspaper *on dits* or the declaration of superficial vignerons. A competent jury would probably have discovered that before the bees "extracted the juices," some other insect had punctured the grapes, or over-ripeness had caused them to *burst their skins*. To ascertain the truth in the premises, let a duly qualified committee of investigation be appointed next season, by the grape-growers and horticulturists of that highly-favored land; and let the chairman be instructed to send us a copy of their report for publication.

☞If, when examining a hive to ascertain whether the young queen has become fertile, we find one or more rudimental royal cells, containing eggs or larvæ, we may safely conclude that the queen has been lost, and that the eggs were laid by a fertile worker.

Double Bottom-board.

The usual mode of enlarging hives, so as to furnish room for the storage of honey, adopted by those who use common hives, is called *storifying*, and consists in piling hives or boxes on or against each other, with a free communication between them. When an empty box or hive is placed *on* a full one, it is called *supering;* when placed *under* the full one it is called *nadiring;* and when placed *against the side* of the full one, with a communicating passage in the adjoining sides, it is called *collateral hiving.*

Though these several processes have long been employed, they have not, in any case, been permanently attended with satisfactory results. A different mode is now adopted by those practical beekeepers in Germany who still use the common hive, and is found to yield all the advantages which were expected from the former, without any of their disadvantages.

The desired enlargement is effected by means of what they call a double bottom-board, constructed to accommodate two hives or boxes.—This board is twice as long as an ordinary one, and in its central portion a channel, twelve inches long and four inches broad, is scooped out in such a manner that its greatest depth, midway, is $\frac{3}{4}$ of an inch, extending thence either way to the ends (b, b,) with a gradual upward slope. The central portion of the channel is covered with a piece of board six inches square and $\frac{1}{4}$ of an inch thick, which is let in flush with the surface of the bottom-board, thus forming a covered way or tunnel $\frac{1}{2}$ an inch in the clear at its deepest part, and amply large enough for the passage of the workers. In the middle of this board a narrow slit (c, c,) is cut, four inches long, or just the width of the channel, into which a piece of sheet-brass may be inserted, to close the passage below.

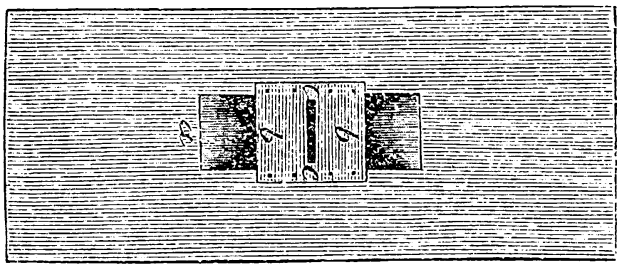


Fig. 1.

Fig. 1 shows such a double bottom-board, as constructed for hives which have the entrance for the bees in their base or lower edge. When the board is wanted for hives which require the entrance to be cut in the bottom-board, the construction is as shown in fig. 2.

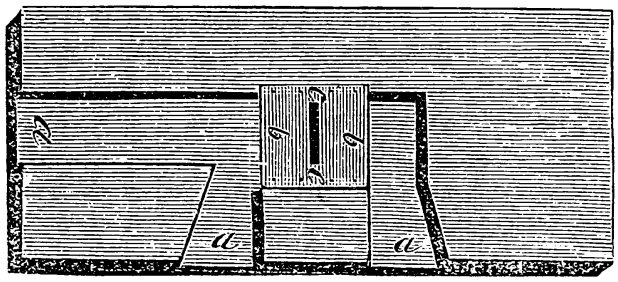


Fig. 2.

In this, three entrances (a, a, a,) are provided, so that whether the board is placed lengthwise or broadwise, there will, in either case, be a front entrance. The other entrances are, of course, kept closed when not in use.

Another and simpler kind of double bottom-board, chiefly intended for a different purpose, is represented by fig. 3.

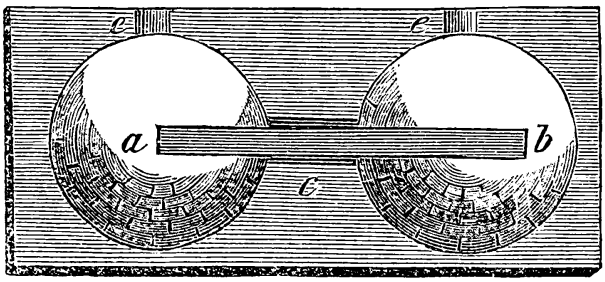


Fig. 3.

In this the channel is eighteen inches long, four inches broad, and three-fourths of an inch deep throughout. The hives are placed on it six inches asunder, and the intervening portion of the channel is covered by a piece of thick glass, (g) six inches broad, set in the board flush with the surface. This is protected by a suitable board, with a piece of dark-colored woolen cloth intervening. The entrances (e, e,) are cut in the bottom-board, if the hives used require it.

The manner of using these double bottom-boards will be explained, when treating of the management of bees in common hives.

SUPERSTITION.

Among the peasants of Livonia the genuine beekeeper never pronounces the word "*bee*," as he believes the expression would inevitably bring misfortune on his apiary. He always speaks of them as "*forest birds*," and however frequently or severely he may be stung, he bears the pain with mute stoical fortitude; never giving utterance to his feelings, for fear he should offend his "*forest birds!*"

☞Ants are frequently troublesome pests in an apiary. To get rid of them, mix equal parts of potash and sugar, pulverising the whole in a mortar. Set the mixture, in shallow plates, in places which the ants frequent.

Copulation of the Queen Bee.

JANSCHA, HUBER, and DZIERZON, relying on evidence entirely satisfactory to themselves, concurred in the conviction that the fecundation of queen bees is effected by the drones, on the wing, and in the open air, though neither of them ever actually witnessed the concourse of queen and drone. Many German apiarians have for years past been vigilant observers, in the hope of obtaining ocular demonstration of the fact; but so unsuccessful have they been, that one of them said of it despondingly, a short time ago, "human eyes have never beheld it, and probably never will."

In January, 1850, the Bienenzeitung contained an account of what came under the notice of Mr. Hanneman, then of Wartenburg, in Thuringia, but now of Rio Grande du Sol, in Brazil, where he established a large apiary, and made an ample fortune by bee culture. After stating that on the 6th of July, 1849, several swarms issued from his stocks and were hived, he adds:—"When the swarms had been placed in the apiary, and the bees commenced flying, I was anxious to watch them closely, but found it impracticable, as I had then about 150 colonies, many of which had become so irritated by my operations, that it was unsafe to approach them. The wind was from the west, and a few fleecy clouds floated in the atmosphere. While sitting in the shade of a tree, about thirty paces from the apiary, my attention was attracted by an unusually loud humming. Suddenly I saw some twenty or thirty drones in rapid pursuit of a queen bee, at an elevation of 25 or 30 feet from the ground. The cluster occupied a space apparently two feet in diameter, and in their course sometimes sunk to within ten feet of the ground, and then rose again, passing from north to south. I followed them about 100 paces, and then lost sight of them behind an intervening building. While they were thus pursuing the queen, the cluster presented this appearance—

except when it approached the ground. Then the mass became more condensed and circular, closing together so thickly that they seemed almost to touch each other as they flew, appearing thus—

Before they vanished from my sight, the queen made her escape from among the encircling drones by a sudden turn, and I saw her distinctly, shooting ahead, and rising higher in the air, the drones in full pursuit—the whole resembling this figure:"

This spectacle was corroborative, but not demonstrative; and this is the nearest approach any of the German apiarians have yet made towards obtaining an ocular solution of the problem.

American observers have been more successful, and may now claim the palm which their German brethren failed to secure. In the spring of 1857, Mr. Lewis Shrimplin, of Wellsboro', Va., enabled himself to obtain a distinct view of the pursuit of the queen by the drones, by catching one as she issued from her hive, and attaching a fine silk thread to one of her thighs. When again permitted to fly, she began to rise in the air, and he saw the drones collect in large numbers and follow in pursuit. This precisely confirmed the statement made by Mr. Hanneman, and furnished the additional fact that the queen, on her return, was found to bear the evidence of fecundation.

The Rev. Mr. Millette, of Whitemarsh, Pa., was more fortunate, and appears to have been the first who witnessed the actual encounter. The following communication from his pen, which we copy from the "FARMER AND GARDENER" for November, 1859, settles the important fact, as it came under his observation in the preceding summer:

"DRONE AND QUEEN BEE.—IMPORTANT FACT.—There is no department in Natural History where there is so much room for doubt and skepticism as in the study of the honey bee, and the reason is obvious—there is so much that is really wonderful, and at the same time true. Until late years, such has been the construction of the hive, that its internal economy has been hidden to the eye of man, and all the phenomena of bee life has been left to conjecture. The following fact occurred under the writer's own observation, and is put on record in order that others interested in bee keeping may be led to give their experience in the matter of the queen's impregnation, if any facts have come before them.

In the month of June, an old stock threw off a *second* swarm, in which there were four queens. During the process of hiving, one of the queens was observed on the wing, and in a moment after was seized by a drone. After flying about a rod, they both came to the ground in close contact; the writer instantly followed them up, and as the drone was about departing, (having broken loose,) seized both the bees, the queen in one hand and the drone in the other. They were taken into the house and left at liberty to fly, when the queen flew to the (closed) window, but the drone after crawling about on the hand, was laid upon the window seat, and in a very few minutes expired. Both the queen and drone had a white milky fluid upon the extremity of the abdomen, and upon pressing the drone, there was no indication of his possessing the speciality of his sex.

One fact will not establish a theory; but when many can testify in the same direction, it forms a galaxy of evidence which cannot be refuted. It is Huber's idea that the queens and drones meet

in the air, and it has occurred to the writer, as well worthy of experiment, to collect a number of drones and let them fly with a *virgin* queen in a high room, and thus endeavor to verify this fact, so emphatically laid down by Huber."

To this we append the following extract of a letter from Mr. S. B. Parsons, of Flushing, N. Y., confirmatory of all that was conjectural before. We may remark that the observers, in this instance also, are men whose statements may be implicitly relied on, and so familiar with bees that all doubt as to the possibility that they may themselves have been mistaken, is entirely precluded. Mr. Parsons says:

"One fact in our last summer's experience will interest the readers of the Journal. The copulation of an Italian drone and queen, upon the wing, was witnessed in my apiary by Mr. Carey and Mr. Otis.

They saw the queen issue from the hive, and circle round, when a drone struck her, (both being upon the wing). A sharp snap ensued, the drone fell to the ground, and was picked up dead. The queen fell in the grass, rose again, and entered the hive. Mr. Carey soon searched for her, found the workers cleaning her off, and the male organs attached to her body.

This settles definitely what Janscha and Huber believed without ocular evidence. I am not aware that the actual copulation has been seen before."

☞Since the foregoing was prepared, we have received the following more detailed account of Mr. Carey's observations, as communicated by him to a mutual friend, which we hasten to submit to our readers:

COPULATION OF A QUEEN AND DRONE ACTUALLY SEEN.

Although the copulation of the queen and drone undoubtedly takes place while they are on the wing, it will interest many to know that it has, at last, been seen. The following is the substance of a letter addressed to me by Mr. Wm. W. Carey of Coleraine, Mass. Mr. Carey has had much experience in the management of bees, and was engaged last summer in propagating Italian queens for Mr. S. B. Parsons, of Flushing, Long Island. He says:—

"About three o'clock, P. M., on the 8th of July, I saw a young Italian queen enter her hive without any signs of impregnation. She came out again in a few minutes, and I closed the entrance to the hive. During her absence, which lasted thirteen minutes, three drones came in front of the hive, and finding the entrance closed, kept on the wing most of the time. When the returning queen was about three feet from the entrance, one of the drones very rapidly flew to her and clasping his legs about her, caused both to settle a little and to come in contact with a long spear of grass. At the same time an *explosion* was distinctly heard, and they immediately separated—the drone falling to the ground perfectly dead, and having his abdomen very much contracted. The queen, after making a few circles in the air, entered the hive with the male organ of the drone attached to her. All these facts were witnessed by myself and Mr. R. C. Otis, of Kenosha, Wisconsin, as we were seated on opposite sides of the hive, not more than six feet apart—so that there can be no possible ground of mistake."

Prof. Siebold, in his work on "*Parthenogenesis*," says:—"As in the act of copulation the penis of a drone is completely extruded outwards, and as no particular muscular apparatus exists for the extrusion of the penis, the circumstance that the drones copulate in flight has an important signification. * * * During the movement of the wings, the different air-sacs of the tracheal system of the drones are filled with air, by which means these can act by *pressure*, in the interior of the body of the drone, upon the neighboring penis which is to be protruded."

On page 125 of "*Langstroth on the Hive and Honey Bee*," it is mentioned that while a drone is held in the hand, its male organ may often be made to extrude, with a motion very like the popping of roasted pop-corn. In every such case the drone perishes instantaneously, but its penis remains so firmly attached to the abdomen, that it has been difficult to conceive how it can be detached in the act of copulation. The "*explosion*" so distinctly heard by the two observers, shows that "the filling of the different air-sacs," while the drone is on the wing, *detaches* the penis.

L. L. L.

It is exceedingly gratifying to us that the "*American Bee Journal*," at this early stage of its existence, is thus distinguished as the medium of decisive information on one of the most interesting as well as most controverted points in the natural history of the bee. We have long believed that when once the physiology and habits of this admirable insect are made subjects of earnest and persevering study in this country, the many obscurities which have so long perplexed observers, will be satisfactorily elucidated; and the instances here given of success, under circumstances not more favorable than those by which Europeans have for years been surrounded, are well calculated to strengthen our faith and induce us to look for other cheering results.

☞ According to an official census taken in 1853, there were then in the kingdom of Hanover, 218,865 colonies of bees. The Rev. Mr. Kleine thinks that, at a moderate estimate, the country could support at least ten times that number.

☞ Bees never store pollen in drone-cells.

FIRST AMERICAN

Beekeepers' Convention.

We take pleasure in placing on record in our columns, the proceedings of the first American Beekeepers' Convention, which met at Cleveland, Ohio, on the 15th of March, 1860. The time is approaching when bee culture will occupy a higher position than it has yet held in this country, and when it will be interesting to trace back its history to those pioneer movements which conduced to revival and progress.

[From the Ohio Farmer.]

BEEKEEPERS' CONVENTION.

First Day.

On motion of E. T. Sturtevant, Prof. J. P. Kirtland was elected Chairman, and J. Kirkpatrick, Secretary.

By S. C. Brown. *Resolved*, That a business committee be appointed by the Chairman, who announced S. C. Brown, A. F. Benton, Joel Merriman, E. T. Sturtevant and Dr. T. Garlick.

The Chairman presented communications from Samuel Wagner, Esq., of York, Pa., and T. J. Mahan, of Philadelphia—referring principally to the Italian bee, which were read by the Secretary.

The Committee reported that it is desirable to form a Beekeepers' Association, and also the following questions for discussion: 1. What is the best mode of wintering bees? 2. Is it policy to feed bees? If so, what constitutes the best feed? 3. Is natural swarming the most judicious mode of propagating bees? 4. What is the superiority, if any, of the Italian bee over our common kind? Accepted.

On motion, a committee of three was appointed to draft a Constitution, consisting of S. N. Sanford, E. T. Sturtevant and S. Miller, who reported a Constitution which was accepted and adopted.

A committee consisting of W. M. Cunningham, Eli Bartholomew and W. A. Flanders, was appointed to nominate officers, who reported. The ballot was then taken, when the following gentlemen were declared elected:

Prof. J. P. Kirtland, President.
Wm. M. Cunningham, Vice President.
E. T. Sturtevant, Corresponding Secretary.
J. Kirkpatrick, Recording Secretary.
J. Gallup, Treasurer.
T. W. Morse, S. C. Brown and L. M. Cobb, Executive Committee.

The meeting then took up the

FIRST QUESTION.

What is the best mode of wintering bees?

Mr. Sturtevant gave a history of his experience on this point. He said that the hive should be tight at the bottom, with an opening at the top during winter; and also stated that he had buried hives the past season, with the best results. The bees had increased in numbers, although many of the swarms were late ones, and not well supplied with stores. In a few minutes after being taken up, the bees were perfectly active.

Rev. L. L. Langstroth stated that at one time he deposited his hives in a deep cellar, that was very dry during the winter. The bees remained inactive, and came out well in the spring. At one time, he had an idea that it was necessary to have his hives with double walls, and filled between with charcoal or sawdust, but by experience found that the hive thus constructed did not do well. Air is absolutely essential. Cold did not kill them when in mass. It is necessary to have thorough communication between the combs. In his opinion, the thickness of the hive walls is non-essential, but an upper circulation must be had.

Mr. Merriman agreed with the previous speaker. When a boy, at the East, his hives, along with those of others, suffered from winter-killing, and the idea struck him that it was owing to the want of air, and bored holes in several of the hives with an auger. All the hives so treated did well; but those not ventilated suffered. Every beekeeper knows that bees generally winter well in some old hive, full of cracks, through which the air can circulate freely.

Dr. Metcalf asked if hives, buried in winter, would not do equally well covered with clay as with sand?

Mr. Sturtevant stated that he had covered his with sand, because he had no clay, but thought that clay would do better; upward ventilation was, however, necessary.

Mr. Merriman stated that an uncle of his buried his bees with good success, without ventilation.

S. C. Brown had lost many swarms. He did not believe that there was such a thing as *luck* in beekeeping. Some of his swarms had died from an overplus of honey, the brood combs being filled with honey, leaving no room for new brood, and there was a consequent falling off in the population of the hive, the queen having no empty cells in which to deposit her eggs.

Mr. Langstroth read a quotation from Columella, in corroboration of this difficulty. In the time of that author, hives suffered from over-avarice.

Mr. Sturtevant said that swarms having no queen, often stored honey faster than those having one, but thought that the swarms mentioned by Mr. Brown had never had a queen, being divided ones.

The President said he had several hives that were so full of honey that they had no room for brood. He had lost no swarms the past winter.

Mr. A. K. Smith asked if bees would protect themselves when without a queen.

Mr. Sturtevant said that this is often the case.

Dr. Dunham asked why some divided swarms, having no queen, will lie idle until a queen is hatched out?

Mr. Sturtevant replied, that, in his opinion, this was owing to the small number of bees that were often left in such hives, and gave illustrations from his own experience.

Mr. Langstroth read from Butler's work, written and printed in the time of, and dedicated to, Queen Elizabeth, in illustration of this point; the same observations were made centuries ago.

Mr. Smith observed that many of his hives had suffered from an over-filling of the combs with honey.

T. S. Underhill remarked, that as the Association had left the question on which it started, he would, with its leave, return to the original subject. He had found one great difficulty in the burying of swarms, from the fact that when opened, the bees would come out and get mixed faster than the hives could be removed. He approved of burying in dry cellars, as the bees could be easily and gradually removed. Bees suffer from their inability to reach the outer combs during cold weather. They eat all the honey within reach, and then starve within a short distance of plenty. Upper ventilation is always necessary during the winter.

Mr. Sturtevant lost nineteen swarms in unventilated hives one winter, in consequence of sudden cold, chilling the bees while wet.

S. C. Brown remarked, that many lost swarms that were apparently in excellent condition last fall, from the combs being filled with eggs, and nearly all the honey deposited in the upper boxes, and this removed as surplus.

SECOND QUESTION.

Is it policy to feed bees? If so, what constitutes the best feed?

Mr. Smith said he usually took up an old hive that was of little use, destroyed the bees, and fed the young or weak swarms with it. He feeds by placing pieces of the comb in the upper boxes. The safest way to save young swarms is to feed old honey.

Mr. Merriman's profits from beekeeping exceeded that from any other kind of farm stock. Has fed good honey to his bees; did not approve of feeding poor honey, or any other substitute. Chestnut honey is the poorest he knows. Water mixed with bee-feed does not add to the quantity of the feed.

S. C. Brown considered that it was not good policy to feed. Our hives should be in such a condition that the bees do not need to be fed.

Mr. Sturtevant considered that feeding bees for the purpose of producing marketable honey, is a short road to the poor-house for the beekeeper, and gave a short account of the period during which honey is gathered. Strong swarms, by the first of May, will always collect sufficient stores. When, through improper division of swarms at a late season, a swarm proves light, it should be fed, or united with another swarm. Feeding by placing frames filled with comb and honey, is the best.

Mr. Langstroth approved in general of Mr. S.'s views, with a few exceptions. The idea that poor feed can be turned into good honey, is a stupendous swindle. Honey derived from different sources, has each its distinctive characteristics.

Second Day.

FRIDAY, MARCH, 16th, 1860.—The President, Prof. J. P Kirtland, in the chair.

The President read an article from the Morning Leader, on the passage of a bill through the Legislative House, punishing bee-hive or honey stealing. This elicited considerable discussion, all agreeing, that at present there is no real law for the punishment of bee thieves. The committee on business reported the following resolution on the subject:

Resolved, That it is expedient for this Association to petition the Senate of the State of Ohio, to concur in the passage of the bill passed by the House of Representatives, for the more efficient protection of beekeepers.

Which was adopted, and a committee, consisting of Prof. J. P. Kirtland and E. T. Sturtevant were appointed to draw up such a petition. Moved, that the Corresponding Secretary be requested to confer with the census bureau at Washington, in regard to the necessity of the assessors taking an account of the number of bee-hives, and the amount of products in the various States.

Several questions were presented for discussion. The question for discussion was then taken up.

Mr. Merriman said that if bees were allowed to rob even from hives without bees, they would soon rob all round.

The President said he would feed his bees for the purpose of a general stimulus, but he would place the honey at a distance from the hives. Weak swarms should be fed in boxes within the hive.

Mr. Langstroth thinks that if a bee once gets into the habit of stealing, it will always steal, as long as it has an opportunity, even unto the day of its death. Robber-bees are easily known. They don't approach the hive like honest bees, but approach and then retire in a suspicious manner.

Mr. Smith had suffered from robbers; some of his swarms had become robbers a year ago, and still exhibit the same bad habit.

Mr. Langstroth would recommend that whenever a swarm endeavors to rob another, it is best to close the latter, and when the robbers cluster in masses on the outside, sprinkle them with cold water, and keep sprinkling them, they will go home cooled off.

Mr. Flanders advocated the feeding of robbers, as in his opinion they needed food.

Mr. Langstroth and Mr. Sturtevant agreed that it is not the poor, weak swarms that become robbers, but the old, strong swarms that have their hives stocked with honey. Mr. S. would cut down a comb and let the honey run in the robbers' hive, when they will immediately attend to affairs at home. He also advocated the feeding of weak swarms at night.

Mr. Bartholomew thought that swarms never rob unless food cannot be obtained otherwise.

Mr. Merriman agreed with others in thinking that few hives were robbed, unless without a queen. Hives that are attempted to be robbed, should be removed to a different stand. When a hive is fairly conquered, it is best to let the robbers have free leave to clear the hive out, and they will stop when the honey is exhausted.

Dr. Garlick found the strong swarms liable to rob, but found cold water sprinkled over, was a good plan to cool them off. He has found hives rich in honey, clear of bees this spring.

Mr. Underhill thinks that bees from weak swarms are the first invaders, but that in the battle the strong ones are the victors. Queenless colonies may be expected to be robbed. He gives all his swarms plenty of honey. Weak swarms should have the entrances contracted in the spring, as by this means they can the more easily protect themselves. Some years ago, his hives had to be

fed generally in the spring, owing to the unfavorable weather during the honey season the previous summer, hindering them from laying up sufficient honey. That season he suffered more from robbers, than at any previous or subsequent period.

Mr. Bartholomew thought that making artificial honey for the purpose of feeding bees, is very poor business. A little feed given early in spring, will encourage breeding, and thus benefit the swarm. Bees quit breeding when the pasturage ceases.

Mr. Langstroth considered that much fall robbing is the result of careless handling, in removing honey or opening hives; care should always be taken in this. Bees will breed when not collecting honey. Aristotle mentions that wet seasons produce great swarms, dry ones much honey; and this observation was made by many of the older writers, as well as moderns.

Mr. Sturtevant said that from the closest observation, he had learned that bees began to breed by the first of January, in a little spot; with the advance of the season, this increased in size.

AFTERNOON SESSION.

Bee Bread.

Mr. Sturtevant had used unbolted rye flour as a substitute for pollen or bee-bread. In one day, his bees had taken up as much as sixty pounds. His method of using this, is to take a wide board with slips about two inches deep, nailed all round and placed in a warm, sheltered situation, and on that place the flour.

Mr. Langstroth said that rye-flour is used to a great extent in some parts of Europe. Breeding is sometimes suspended in new swarms from the want of pollen, as such swarms are usually deficient in the supply of bee-bread. In his opinion, artificial pollen is not equal to the genuine article.

Italian Bee.

On motion, the character and history of the Italian bee was taken up.

Mr. Langstroth stated, that Mr. Wagner, of York, Pennsylvania, endeavored to introduce the Italian bee five years ago, but the swarm arrived dead, in consequence of the mate of the vessel stealing the honey; and also read from Virgil and Columella, showing that this bee was well known to the ancients. The claims for this bee are that they are hardier, swarm oftener, and work during days when the common bee will not work. They also fly faster, and are in all respects more active insects than the others. It is believed that the tongue of this insect is longer than that of the common species, and it is thus enabled to obtain honey from sources incapable of being reached by a shorter tongue; for example the red clover. He considered that in the hands of the mass, the Italian bee would prove a failure. Some, however, would succeed, and its good qualities be brought out. Last fall, Messrs. Wagner, Mahan, and himself, had imported a few stocks of these bees, and this was prior to the importation of Mr. Parsons and the Patent Office.

Mr. Sturtevant would do what he can to protect beekeepers, and hopes that all will take care from whence the Italian queens, they may obtain, come; and that they be not received from regions where the disease called "foul-brood" is prevalent, a disease utterly unknown in Ohio or the West.

Prof. Kirtland said that if the Italian bee was a distinct species, it would be easily retained; but if only a variety, it would take a great deal of care to keep them distinct, in places where the common species was abundant, in consequence of inter-breeding.

Mr. Langstroth said native queens, fertilized by the common drone, would produce hybrid workers and queens, but pure Italian drones, so that the next generation would be more Italian than common, and future generations will prove still purer.

Mr. Underhill described the appearance of "foul-brood." At the beginning of the disease, the cap of the cells turns dark, in consequence of the death of the larvæ. At first it appears yellowish; after a year or two, all the combs will be affected, and the stench is great from the decomposed matter. Honey from such hives fed to other swarms, will infect such swarms, increasing the disease. A queen taken from an infected hive, will lay eggs that do not produce diseased brood. It seems to be confined to pine regions, and is not known in the places where such trees do not grow. Boiling infected honey and skimming it, deprives it of its noxious qualities. If we find a hive slightly affected, we drive the swarm out and place them in a new hive. Hives clear of disease in summer, will often prove infected in the fall. An infected hive should not be allowed to remain in the apiary in spring.

On motion, it was resolved that our Representative in Congress, Mr. Wade, be requested by this Association to procure from the Patent Office, for the use of this Society, a colony of Italian bees; and if he succeeds, the colony be intrusted to the care of the President of the Society, together with two other members, viz: Mr. W. A. Flanders and E. T. Sturtevant.

Natural vs. *Artificial Swarming.*

The next question for discussion being, "Is natural swarming the most judicious mode of propagating bees?"—Mr. Sturtevant observed that he would rather that some other person would speak on the subject. It is conceded, at this time, that hives can be artificially swarmed. He considered artificial superior to natural swarming, as the former have more time to collect stores, and there is no loss from swarms leaving, which is a great drawback to keekeeping.

Mr. Langstroth said that for ignorant persons, natural swarming is the best; but in the hands of intelligent beekeepers, artificial swarming is preferable. The watching for the swarming of bees is avoided in the latter case. It is far more profitable, even with the common box-hive. Swarms seldom leave large apiaries, and it is seldom that a swarm can pass over such without. Mr. L. explained his method of dividing swarms.

Mr. Underhill said that if apiarians in his section of country, would depend on natural swarming, there would be but small increase. If a rapid, sure increase is desired, artificial swarming must be resorted to. It is also much cheaper, for it requires less attention and labor.

Bee Houses.

Question.—Is it a fact that bees will not prosper in a well-constructed bee house; or what are the advantages and disadvantages of such an apiary?

Mr. Langstroth considered that bee-houses were not the best for the benefit of the apiarian, principally from the loss of the young queens when they leave the hive for the purpose of meeting the drones, as they are apt, on their return, to enter the wrong hive, and be there killed, and the consequent decay of the queenless swarm; giving a great number of instances of this being the case. He would say to all, *scatter your bees;* place one hive under this tree, and another under that, but *scatter the hives.* A scientific beekeeper may succeed in using a bee-house.

Mr. Flanders endorsed the opinion of Mr. Langstroth, and also found that hives scattered about the orchard have done the best. It cannot be expected that bees will succeed well in a covered bee-house.

Mr. Sturtevant uses a large bee-house, but does not allow the bees in it to swarm, but always divides his swarms, taking the queenless swarm away from the apiary, and if desirable, returning it to the house after the queen is fecundated. He would use out of the house, or in a bee-house, the common hive with frames, (the Langstroth hive, manufactured by Ransom, Cobb & Co., Cleveland.) Hives must not be placed on a common level, where they can run from one to another. His bees had laid up an immense quantity of honey the last season; the house is airy and cool, built of brick. Hives should face in different directions.

The President stated that if a buffalo robe, bundle of straw, or other unusual object be placed on the old stand, from whence a hive has been carried, the bees will, when they return to the old stand, immediately leave for the hive.

Mr. Merriman moves his bees wherever it is desirable, and never has any difficulty.

Mr. Underhill thought that hives, when moved, should be stirred up, agitated; they will then look out when they issue in search of food. He did not approve of bee-houses. Adjourned *sine die.*

J. P. KIRTLAND, *President.*

J. KIRKPATRICK, *Secretary.*

BEE MART

In the village of Amersfort, in Holland, a regular *Bee Market* is held annually in the second week of August, after the buckwheat blossoms cease to furnish pasturage. The beekeepers in the surrounding districts then drum out the bees of such stocks as they do not intend to reserve for wintering, and bring them to market for sale, in small hives provided with a feeding apparatus. The bees are bought by dealers, who transport them to the heath districts, where ample fall pasturage enables them to build new comb and gather a plentiful supply for the winter. Six thousand stocks thus drummed out, were sold at Amersfort market, in August, 1857.

[For the Bee Journal.]

Inquiry.—Narrow Hives.

Would it not be advantageous to place natural swarms or artificial colonies in narrow hives, affording them no more room than the crowd can properly fill, and giving them, at the start, just so many frames as bees can conveniently, yet fully, cover? Would they not, in such hives, be constrained to built straight combs, impelled to do so by their crowded state, the shape and narrowness of the hive, and the high and equable temperature maintained while founding and extending their works? Do not swarms work more industriously in small hives; and when the bees become too much crowded, will it not be easy to give them more room by transferring one or more combs containing sealed brood to some other similar hive, and inserting empty frames instead? May not such narrow hives, with the aid of reserve queens, be used as workshops for the production of comb and brood? And where a considerable number of such are kept for this especial purpose, may not the beekeeper be enabled, by the removal from them of comb with sealed brood, at proper intervals, to build up new colonies easily by means of comparatively few bees, while the weather and pasturage are favorable? Such small colonies would, of course, need close watching; but if they built straight combs and produced brood rapidly, might they not be turned to good account in an apiary? †.

DR. ASZMUSZ, of Podolsk, near Moscow, says that while cultivating bees in common hives, he observed that first swarms built their combs from front to rear in their hives; the first after-swarms built them diagonally; and the second after-swarms built them from side to side. If he united a first with a second after-swarm, the combs were built diagonally, except one or two in front nearest the entrance, which always ran parallel with the front.

Has this been noticed by any other beekeeper? If it be a fact, it may perhaps serve to explain the irregularity in comb-building occasionally complained of in movable frame hives.

☞In Gallicia, in the southern part of Poland, the annual product of wax is about 750,000 lbs.; and of honey 15,000,000 lbs.

☞The bees cultivated in the northern districts of China, appear to be only a variety of the common kind, somewhat smaller in size.

AMERICAN BEE JOURNAL.

Philadelphia, March, 1861.

TO CORRESPONDENTS.

All who are interested in the subject of Bee Culture, are respectfully requested to contribute to our columns. Communications to insure insertion, should be sent in by the first of the month at the latest, and as much earlier as possible.

Address them to A. M. SPANGLER & Co., Publishers, "AMERICAN BEE JOURNAL," No. 25 North Sixth Street, Philadelphia.

A number of Inquiries, Suggestions and Communications, have been received, but at too late an hour for our present number. They will be attended to in our next.

CLUBS! CLUBS!!

Our thanks are due to the friends who have given us the benefit of their influence in behalf of the Bee Journal, by raising handsome clubs. We hope their wholesome example will be followed by many others. Why should it not be? The terms are exceedingly liberal, and the quality of the matter furnished such as should satisfy every one. Every day will add to the interest and value of the "Bee Journal." Every day brings us new correspondents, and new facilities for adding to the interest and value of its contents. All that is now wanted, is a united effort on the part of Beekeepers generally. Will they make it? We hope they will.

THANKS!

We again tender our thanks to our editorial brethren, for the very handsome notices they have been pleased to give our Journal. It may be a gratification to them to know that a most lively interest has been awakened in its behalf, and that there is everything in the future to encourage. The Beekeeping community have resolved, and we think will, undoubtedly, sustain the only effort that has ever been made, to establish a purely American Bee Journal.

PRINTING.

We are prepared to execute orders for Plain and Fancy Book and Job Printing, at short notice, in good style, and on reasonable terms. We give special attention to Catalogues, Pamphlets, &c. Those who desire good work, at low rates, are requested to call and examine specimens.

APIARIAN CONVENTION.

☞ We learn that a Beekeeper's Convention is to be held at Cleveland, Ohio, on the *second Tuesday* in March next. We hope it will be well and numerously attended.

REMITTANCES.

Those who wish to remit money for subscriptions are respectfully requested to observe the following suggestions:—

Give the Name, Post Office, County and State in full. Write them so plainly that they can be read with ease.

In sending money we prefer gold. Gold dollars can be sent with safety, if fastened to the letter sheet by having a small piece of paper glued or pasted over them.

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SEND US THE NAMES OF BEEKEEPERS.

Quite a number of friends have complied with the request made in our last, regarding the names of Beekeepers. We now repeat the request, as we are very desirous, if possible, of bringing the Bee Journal before the notice of every apiarian in this country.

Send us names, friends! and we will supply the specimen copies.

ADVERTISEMENTS.

Those of our readers who have Hives, Bees, or in fact anything connected with the Apiary to sell, will find a most desirable medium in our advertising department. We are printing large editions, which are distributed freely amongst Beekeepers and others, in every portion of the country. Our terms are liberal, and may be found on second page of cover.

Monthly Management.

MARCH.

Though February may have been too cold and inclement to allow the bees to fly, this month will almost certainly afford them frequent opportunities to leave their hives. On the first occasion that they can issue freely, all the colonies should be carefully watched, to ascertain whether any among them are queenless. Those which manifest no uneasiness and remain quiet in the hive, after they have ceased to fly, may be regarded as in good order in this respect. But such as appear restless and discontented, passing in and out of the hive with a dissatisfied air, and running hurriedly over the front and sides of the hive, may be looked upon as certainly queenless—more especially if, on lifting the hive slightly and blowing in some smoke, they utter a peculiar plaintive moan never heard under other circumsnances.

A queenless colony, at this season of the year is of little value as an independent stock, and had better be at once united with some feeble colony having a fertile queen, if there be any such in the apiary: if not, then unite it with its nearest neighbor. The attempt to rear a queen would most probably result in disappointment; and if the colony be suffered to remain on its stand till spring fairly opens, it will, in all likelihood, be attacked and destroyed by robbing-bees, for these would speedily discover its destitute condition.

When weak stocks which have a fertile queen happen to be assailed by robbers, and cannot conveniently be removed from their stand, it is advisable to contract the entrance so that only two or three bees may pass at a time; and it will be serviceable also to rub the alighting board and front of the hive with garlic, onions, wormwood, or other acrid substance which bees dislike. The odor of the bees' poison and of formic acid is likewise useful in such cases, and may be employed in like manner to repel robbers. A piece of paper dipped in formic acid may be used as a blind at the entrance of the hive, to conceal it and deter the assailants.

As the weather grows warmer, the bees spread themselves over a greater number of combs, cleansing them of impurities, removing all the dead, and carrying out also the droppings which lie on the bottom-board. This is a laborious task for them, and many bees perish while thus engaged. It is consequently advantageous to relieve them of the labor as much as possible, by lifting the hive and brushing out all the droppings and dead bees lying under the combs; or by removing the bottom-board and substituting a clean and dry one. A few extra boards should be kept for this purpose, so as to expedite the operation, while the weather is mild enough to permit the exchange to be made without detriment to the brood or the bees. Combs which have become soiled or mouldy may now also be pruned, removing only such portion as is objectionable or useless.

If the bees are kept in movable comb hives, one or more extra hive should always be provided, so that on some favorable opportunity, the frames, combs and bees may readily be transferred into a clear and dry hive, from the one in which they were wintered. This is the speediest and most effectual mode of "cleaning house" and getting rid of impurities and refuse matter. After the transfer has been made, the interior should be thoroughly scalded and washed, and well dried to prevent mouldiness, so as to have it ready for future use. Unless the weather continue unusually cold, brooding will now be commenced, even in the weaker colonies, and be already abundant in the stronger or more populous. Though not in itself desirable at so early a period in northern districts, it is in fact as difficult to prevent or restrict, as it is to keep trees and plants from sprouting on the approach of spring. Still it is well not to encourage or promote brooding by any interference on our part. That would be as injudicious and injurious as it would be to urge trees and plants into bloom earlier than the season justifies.

Stimulative feeding, resorted to by many at this season, is generally useless. The food and time devoted to it are almost invariably wasted. The bees so fed are impelled to issue and fly at times when the weather is unfavorable, and many more perish from exposure than the brood supplies. Stimulated colonies are usually weaker when forage begins to abound than those which were not fed, or fed only sparingly as the exigency required. Even meal feeding, undertaken early, is disadvantageous for similar reasons. It should be resorted to only when the season is so far advanced that there is a reasonable prospect of continuous mild weather.

Certain special objects may certainly, at times, be attained by a system of artificial forcing; but great judgment and skill are indispensable to success. Beginners in bee culture should use it sparingly, by way of experiment—venturing to use it on a larger scale only when by practice and observation, they have learned to employ it judiciously. Ordinarily it is best to wait patiently till the bees can gather pollen from the hazel, the alder and the willow, before undertaking to stimulate them by feeding diluted honey or other saccharine substitutes. Brooding generally commences early enough; and if encouragement be needed, it is more advantageously extended three or four weeks before the fruit trees blossom. If the weather is raw and blustering, the bees should remain undisturbed till the spring fairly opens.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. IV.

We shall proceed to consider the third proposition:

3. The queen possesses the ability to lay male or female eggs at pleasure, as the particular cells she is at any time supplying, may require.

After I had satisfied myself, by the experiments instituted in 1851, that normally the queen is the mother not only of the workers, but of the drones also, I became exceedingly anxious to see her supply drone-cells with eggs. I wished to obtain ocular demonstration of the fact. To this end, in the fall of 1851, having meantime examined properly constructed Dzierzon hives at Carlsmarket, I caused one to be made having a glass door in the rear, which could be covered. It was made of such width as to suit the combs of some of my old hives, and about the middle of October I selected sixteen combs, containing a sufficient winter supply of honey, but consisting of worker-cells exclusively. There was not a single drone-cell in any of these combs. I inserted and arranged them in two tiers, one above the other, and introduced into the hive a strong colony with a young queen. In the spring of 1852, I fed them lavishly with slightly diluted honey, two weeks before the rape came into blossom; and on the evening of the 12th of May, the bees began to *hang out* in clusters. On the 16th, I observed that on all the combs the cells not stored with honey were filled with brood. I now took out the first comb of the lower tier, facing the glass door, and inserted one containing chiefly drone-cells—there being only about 250 worker-cells in a portion of it. From the reverse side of this comb, which could not be seen when inserted in the hive, I had scraped off carefully all the cells from the foundation or middle partition, and cemented thereon instead, a comb of worker-cells, from one side of which, the cells had in like manner been removed. When this was placed in the hive, I could see all the drone-cells through the glass door. It was inserted at 3 o'clock, P. M., and was very soon covered with bees, which commenced cleansing the cells, and repairing such as had been broken or sustained injury. In the evening, when the bees had ceased to fly, those which clustered at the entrance were carefully brushed off, and the hive was removed to a dark room in my apiary. After we had again taken out all the combs, to assure ourselves by close inspection that all the cells were still empty, we commenced observations by the light of a small lamp with a movable shade. But in about forty-five minutes we were compelled to desist, because as the evening was very warm and sultry, the bees soon began to hang out in large clusters, and many of them, attracted by the light of the lamp, perished in the flame. We carried the hive back to its stand, took out the prepared comb, and substituted another for it. On the evening of the 17th, we reinserted the comb, and carried the hive to the dark chamber, having previously made such arrangements as to preclude the outlying bees from seeing the light of the lamp. Our observations could now be pursued more satisfactorily and without interruption—though after a busy day's work, the bees were fanning and humming loudly at the entrance. Some of the cells contained honey carried in on the preceding day, but it was not capped. The bees soon removed this, and we anxiously awaited the appearance of the queen. But greatly to our disappointment,

she failed to present herself, though we continued watching all night. At five next morning, when the bees in the apiary had already begun to fly, we once more replaced the hive on its stand, and removed the prepared comb. On the evening of the 18th we re-commenced observing, I engaging to watch from nine o'clock to eleven. Before ten o'clock the queen made her appearance, and remained inactive about five minutes, whilst the workers were bestowing on her their usual caresses and attentions. She then proceeded to inspect a cell, by inserting her head in it, and immediately commenced laying. I had aroused my attendant, Günther, from his nap, as soon as her majesty presented herself on the comb, and we were delighted to behold *the queen of an unquestionably normal hive lay eggs in drone-cells.* To enable ourselves to witness this act, was the sole design of the experiment, and therein we were completely successful. But we were perfectly astounded to see, when the queen came to the worker-cells, that instead of passing them by, as we anticipated she would, she proceeded without hesitation to supply them likewise regularly, cell after cell. "Oh, that Dzierzon were here!" exclaimed Günther. "Nay," said I, "not Dzierzon, but Busch, the champion of the drone-mother theory—*he* should be here!" *Five* times did the queen change her position, passing from drone to worker-cells, and from worker to drone-cells, continuing to lay till after one o'clock, with occasional intermissions—once for nearly twelve minutes. When it appeared that she was about to leave the obverse side of the comb, I opened the glass door, caught her, confined her in a cage, brushed the bees from the comb with a feather, and counted the eggs. We found 204 in drone-cells, and 28 in worker-cells. I now removed the prepared comb and substituted an empty drone-comb, to ascertain whether any eggs would be laid *in the absence of the queen.* None were laid, and on the evening of the 20th, I found the cells were filled with honey. On the 27th, the cells having been capped, I removed the comb and inserted another empty drone-comb instead. On the 16th of June, when I took out and examined all the combs, I found the drone-comb still empty—containing neither eggs, brood, nor honey. On the 26th of May, a tremendous and devastating hailstorm had destroyed the crops in all the region round, and entirely deprived the bees of pasturage.

In the course of these observations, I discovered what I will here mention incidentally, that bees, when in want of drone-cells, know how to provide a supply for themselves. On portions of several combs, they had evidently demolished the worker-cells, and built drone-cells instead, numbering altogether 68, in which, manifestly, from their appearance, drones had been bred; and I also saw several drones, when brushing the bees from the combs. How suggestive is this fact. Does it not point out clearly the expediency and advantage of restricting and repressing the production of drone-comb, in the brooding apartment of a hive, and of removing therefrom all it contains of such comb?

On the 18th of May, I inserted the prepared comb which contained the worker and drone-eggs laid by this queen, in a hive from which a swarm had issued on the preceding day. On the 8th of June, I took it out and saw in the cells, perfectly developed workers and drone nearly mature.

By this experiment, (which I would suggest that other inquirers also should try, and which I have so minutely detailed to enable others to devise improvements,) it is incontestibly proven, that in the normal condition of a colony, the queen not only lays all the drone-eggs, but—what is of still greater importance—that she is able to lay male or female-eggs *interchangeably, at pleasure.* Will others now continue to pronounce the Dzierzon theory, as to this point, incongruous and absurd? Possibly they may, for even at the Arnstadt Apiarian Convention, the mythical drone-mothers found some devoted champions. Be it so—since every one has it in his power to satisfy himself of the truth, or not, as he pleases—just as the queen may lay male or female-eggs, as she chooses!

The fourth proposition of the Dzierzon theory is:

4. In order to become qualified to lay *both* male and female-eggs, the queen must be fecundated by a drone or male bee.

The correctness of this proposition is now admitted by so large a majority of intelligent apiarians, that I might almost say it is universally conceded. A small number only, still regard it as doubtful or continue to controvert it, because hitherto they have not been able to satisfy themselves that the drones are males. Formerly, I also refused to receive the doctrine, as it appeared to me to be contrary to all analogy, that such clumsy, awkward, sluggish creatures as the drones, so palpably subordinated to the workers, should belong to the male sex. To determine the facts and ascertain the truth, I instituted numerous and most diversified experiments, which involved the total destruction of twenty-three colonies, and the partial ruin of at least as many more. But the result was, that I obtained clear and conclusive evidence of the virility of the drones, and of the purpose of their existence. Permit me to describe in detail,

some of the more important of these experiments.

I began in the fall of 1837, after all the drones had disappeared, by removing the queens from two of my colonies. As these colonies were at my late residence, Seebach, and I then held the office of Referendary at Mühlpausen, I found that I could not prosecute my observations with the requisite attention, and was constrained to defer them till the ensuing spring. In March, 1838, I found that neither of these colonies contained brood, though each had reared and still retained a queen. So likewise the young queen reared in a colony, from which the old one was removed in that month, laid no eggs.

On the 6th and 7th of March, 1843, having returned to reside at Seebach, and established an apiary there of about one hundred colonies, I removed the queens from six of them. Four of these reared young queens, and two remained queenless. No eggs were laid in any.

In June, 1844, I placed three second-swarm colonies at my mill, situated about two miles from Seebach, having previously removed from them all their drones. In two of them no eggs were laid, but I found some in the third. This staggered me for the moment, and I took up the notion, suggested by others, that queens were susceptible of fecundation only at the most genial season of the year. Yet I could not, on the other hand, account satisfactorily for the diverse results obtained. I came to the conclusion finally, that the location of the mill was not sufficiently remote from the nearest apiary to preclude all intercourse between the queens and drones.

I now endeavored to find a locality within the circuit of a league from which no apiary existed and no bees were kept. My researches were fruitless; I could discover no such spot, unless it were in the recesses and seclusion of a distant forest. Even in that by-place it was possible some wild bees might harbor. Inquiring of the forester who had charge of the district, and of the woodchoppers who were employed there, whether they knew of any wild bees within the designated bounds, or had ever heard of any being observed there, I was answered in the negative. The forester said it was reported in former times bees had occasionally been found, but that after all the old and decaying timber was removed, they had disappeared. I then offered the woodchoppers a reward of five dollars for every colony of wild bees they might discover within certain limits; but no one came forward to claim the reward. Thereupon I concluded to make the forest the scene of my experiments. On the 27th of June, 1845, I immersed three second-swarms in a bath, removed all the drones from each, hived the bees again, and transported them by night to the spot which I had selected. This was about three leagues from Seebach, and there I concealed the hives carefully in a dense thicket. Besides myself, my overseer, and a faithful old servant who carried the hives, not a soul knew aught of my proceedings. On the 1st of August, having in the meantime repeatedly visited them alone and in secret, I had the hives carried back to Seebach. No brood was found in either on examination, but each contained a vigorous queen. In 1846, the experiment was repeated, with like results. After the lapse of four weeks, two of the colonies contained no brood. The third had deserted its hive.

These experiments fully convinced me that in the absence of drones, no queen could be fecundated, and that the drones are males, the only males in the colony. I did not subsequently repeat the experiments to establish the virility of the drones; nor shall I do so hereafter. I consider the fact as already empirically demonstrated, and the question definitively settled. It is true, Capt. Baldenstein's experiments led him to a different conclusion. But I cannot hesitate to believe that there was, unknown to him, a colony of domestic bees at some point within a short distance of the Italian colonies with which he experimented.

I must also add that, as I distinctly remember, in my earlier experiments many of my experimental colonies produced drones. But I was then still a firm believer of the doctrine that drone-mothers are regular and essential members of the commonwealth of bees, and the production of drones in colonies of any description, never so excited surprise or suspicion as to induce me to note the circumstances under which it occurred in my bee diary.

Let us now consider the proposition next in order:

5. The fecundation of the queen is always effected outside of the hive, in the open air, and while on the wing. Consequently, in order to become *fully* fertile, that is, capable of laying *both* male and female eggs, the queen must leave her hive at least once.

He who doubts or denies the regular hymeneal excursions of the young queens, which Janscha first observed, should place a second swarm in some isolated locality, and watch it closely when the bees are disporting, at or about noon, in fair mild weather. By vigilant and persevering attention, he will then certainly see the queen issue, take wing, and return—unless she be unfortunate

while away. I have witnessed this in numerous instances. These excursions alone plainly indicate that fecundation is accomplished outside of the hive. But it is clearly proven by the well known fact that virgin queens with crippled wings, or whose wings have been designedly clipped, never become capable of laying *worker* eggs. On the other hand, the wings of a fecundated queen may be clipped, without detriment to her capacity to lay *both* kinds of eggs. I have clipped the wings of eight or ten second-swarm queens just emerged from the royal cells, and not one of them ever laid *worker* eggs.

I would suggest to those who desire to make such experiments, to place the hives level with the ground; otherwise the queen, unable to fly, would be lost. In her efforts to take wing, she falls to the ground, and cannot regain her hive. But if the hive is level with the ground, she will generally crawl back. This also enables one to witness her singular gymnastics in front of the hive, which are sometimes quite ludicrous—especially when only one wing has been clipped.

The invariable inability to lay *worker* eggs, characterising young queens which are, from any cause, incapable of flying, is proof manifest that fecundation is accomplished only outside of the hive, and never within it. This, I think, must be conceded, or will be by those who carefully make the experiments I have suggested.

As for the twin doctrines, that queens are born fertile and do not need fecundation, but only require exercise in the open air to set their ovaries in action; or that the observed excursions take place only after copulation within the hive, and are mere pleasure jaunts; they are too futile to require serious notice—being mere fanciful conjectures, without a shadow of proof or even plausibility.

It is "a fixed fact" that fecundation is accomplished outside of the hive; and this in every instance, without exception. Hence, it is indispensable that the queen must leave her hive "at least once," though repeated excursions may be required. Scarcely one in a hundred becomes fertile after leaving for the first time. Before taking wing on the first occasion, she will generally crawl about on the alighting-board and on the front of the hive, and then hover about awhile with her head turned towards it, alternately receding and returning, evidently noting its form and appearance, and marking its locality ere she takes her departure, so as to be able to find it readily on her return. Nor does she usually remain absent long on this her trial trip, returning to, and approaching the hive as warily, and with as many precautions as when she left it. Even on the second occasion, she still displays hesitation and anxiety; but subsequently she goes and comes with the readiness and freedom of a veteran worker. Generally the young queen leaves for the first time, while the bees are most busily disporting in front of the hive, as though instinctively conscious that that was the most opportune time. We seldom see one issue before twelve o'clock or noon, or after four o'clock, P. M. While she is preparing to leave, the workers pay her hardly any attention, neither feeding nor fondling her; and the drones seem unconcerned and frigid. She commonly begins to make her excursions on the third day after leaving her cell; unless the hive contains other queens, nearly mature, in royal cells. In such cases, the excursions are deferred till all the rivals have been dispatched or removed.

It is evident that copulation takes place in the air, and while both parties are on the wing. A healthy drone is never seen to alight anywhere, except at the entrance of his hive; and queens, when making their hymeneal excursions, always direct their flight upward, and vanish from view at a high elevation. *A priori* evidence of the necessity of this, is moreover furnished by the physical organization of the drone.

POLLEN MITES.

If comb containing pollen be placed in a damp situation, it soon becomes mouldy; but if put in a very dry place, such as a warm chamber, the pollen will speedily be infested with mites. To the naked eye, the surface of the pollen then assumes the appearance of being dusted over with fine meal. Place some such pollen under the microscope, and it will be found to contain thousands of exceedingly minute *mites*, evidently feasting on the pollen. I sent some such comb to Prof. Leuckart for examination, and he informed me that the mites were a species of *acarus*, resembling the common cheese-mite more than any other kind of which he has any knowledge; and that its identity with some other species, might be ascertained by placing it on cheese, mould, &c. I tested them, accordingly, on bread, meal, and cheese; but the mites did not multiply, though I tried the experiment repeatedly. But when placed on pollen, they invariably produced an innumerable progeny in the course of a few weeks. This leads me to believe that the pollen-mite is a peculiar species, not heretofore noticed or described.—DONHOFF.

☞Please send us the names of beekeepers.

[For the "Bee Journal."]

Societies and Clubs.

Among the means employed in Germany for the encouragement and extension of bee-culture, one of the most important and efficient is the organization of Apiarian Societies wherein practicable. Such societies now exist and are operating beneficially in a great number of districts. They have served to excite interest, to combine action, and to concentrate effort. By them, information is collected and diffused. Under their supervision reliable practical treatises on the management of bees have been prepared or procured, and furnished to members and others, at low prices. They have made special exertions to introduce properly constructed improved hives, and employ competent persons to teach the mode of using them in accordance with the most approved modern practice.

The result of these organized systematic operations, has been highly gratifying and flattering. Old and deep-rooted prejudices have, to a large extent, been eradicated from the popular mind, in the sections in which the more energetic of these societies are located. There, apiculture presents itself in a new aspect altogether; and being grounded on a thoroughly digested theory, is not likely ever to retrograde. Success and the resulting profit have given it stability, and must conduce to regular growth and extension.

The larger of these societies, embracing wider bounds, increase their efficiency by establishing branches or affiliated associations, composed of beekeepers who reside near each other, and can conveniently meet for frequent consultation and discussion. Many of these clubs do not number more than eight or ten members; but the aid and countenance extended to them by the parent society, supports their zeal, invigorates their action, and gives direction to their efforts. Thus, by combination and ramification, the influence of the central body is made to reach even the smallest hamlets and most secluded districts.

Union, Ohio. J. STAHL.

(For the "Bee Journal.")

I would inquire of the correspondents of the "Bee Journal," if part of a comb in a hive becomes mouldy, whether that comb should be taken out? We had several hives in a cellar, and the back combs of one that stood near the wall, became mouldy.

Norristown, Pa. W. H. McC.

The beekeepers of Naples call foul-brood *muffee*, (mould.)

(For the "Bee Journal.")

I have two or three swarms of bees that are in a bad condition at this time. I have wintered stocks in a dry cellar, with perfect success; but this winter I don't know but I have failed. The swarms I speak of are in movable frames; and others that are in box-hives are in good condition, to all appearance. These two have a kind of dysentery, as I call it. Now what is the cause of it? A great many bees have died, and there is a very bad scent arising from them. I have removed them from the cellars; but it is so cold here, it will not do to set them out at present—the snow being nearly two feet deep on the ground.

This is not a very good place for beekeeping. I have used the box hive with good success, with boxes on top for surplus honey. Some seasons I get from 25 to 30 lbs. of honey from a swarm. Generally young stocks swarm two or three times here. I have another kind of hive in use, with four boxes, two large and two small ones. Bottom boxes thirteen inches square by seven and a half inches high, in the clear. The small ones hold about 16 lbs. each. By shifting boxes I can move them strong or weak, with very good success. The boxes are above one another, with passages or spaces for the bees half an inch wide.

South Sutton, N. H. W. H. S.

☞The dysentery and consequent mortality, in the above case, were probably caused by the want of sufficient *upward ventilation* in the hives used. When bees in movable comb hives, are wintered in a dark cellar, the honey-boards should be altogether removed, and not replaced till towards the approach of spring, when the bees begin to have brood to nurse. If the cellar is a very dry one, a piece of sponge containing clean soft water should be laid in the frames immediately over the cluster, and occasionally examined and replenished if necessary. Excessive condensation of moisture within the hive, in winter, is always troublesome and frequently fatal to the bees. It is the great obstacle to safe out-door wintering of stocks in common hives; but can easily be overcome in movable comb-hives, by elevating or entirely removing the honey-board.

☞In a favorable year, an acre of buckwheat in blossom can furnish 25 lbs. of honey daily; and a strong stock of bees, not having over a half mile to fly, can carry in from six to eight pounds a day.

☞Is it a fact that first swarms generally issue in the forenoon, and second swarms in the afternoon?

Meal Feeding.

BY THE REV. MR. SCHOLZ.

If the weather is fair and mild, sometime before the earliest hazel or willow catkins make their appearance, and the bees have yet no opportunity to gather pollen, it is advantageous to offer them rye or oat meal as a substitute, of which they will eagerly avail themselves. The meal may be lightly shaken into the cells of old drone comb or put in a shallow box, and set in some sheltered place twenty or thirty paces from the hives or apiary. If offered to them in a box, it should have some short pieces of clean dry straw strewed over it, on which they may alight and form their pellets.

The feeding of meal, at this period, enables the beekeeper to ascertain pretty accurately whether his stocks are in a healthy condition. If the bees of any hive fly briskly, forming and carrying in large plump pellets of meal, he may fairly conclude that they have a vigorous and fertile queen, with plenty of brood to nurse. But a hive whose bees fly languidly and form small, thin, threadlike, and imperfect pellets, is either weak, diseased, or queenless, or has an old and feeble queen and very little brood.

To aid the bees in forming pellets, it is well to place near the meal, a shallow vessel containing sugar-water, into which some small lumps of wax have been dropped. To this they will occasionally resort, using the water to dampen the meal slightly when making up their pellets. To avoid the risk of inciting robbery, the feeding and water vessels should not be placed nearer to the hive or apiary than is advised above.

To keep bees at home during rough and cold weather in the early spring, when they could at any rate gather very little abroad, it is advisable to prepare the following mixture for them:

Take two parts of meal, two parts of pulverized sugar and one part honey somewhat diluted with water, so that the whole may be kneaded to a pretty stiff dough. Put this in a narrow sack of coarse linen from which every third thread of warp and woof has been drawn out, so that the contents of the sack may be easily accessible to the bees. Tie up the sack, and dip it in a pot of hot water, withdrawing instantly. Then flatten it out and lay it on the frames of movable comb hives, directly over the place where the mass of the bees are clustered. The honey-board should have a hole cut through it, suited to the size of the sack, and over this a small tight box should be inverted, to prevent the escape of heat from the interior of the hive. The bees will gradually appropriate the food thus offered to them, which contains in an acceptable form the substance of the pollen they need. They will thus be kept from needlessly exposing themselves by venturing forth, at an inclement season, in search of that which nature does not yet furnish in abundance. If the colony is weak and also needs feeding, the sack when emptied, should be filled again in like manner, and replaced.

The same method of supplying them may be used with common box or straw hives, by cutting a hole of sufficient size in the top, placing the sack therein, and covering it with a close fitting box inverted over it.

It not unfrequently happens in spring, while the fruit trees are in blossom, and when the bees already have much brood to nurse, that a spell of raw, wet weather occurs, continuing for days and at times for weeks. If bees at such periods venture forth, they may often be found benumbed on the flowers or blossoms they have visited, or lying chilled on the ground in front of their hives, having been unable to reach the entrance. Their urgent need of pollen and water, at such times, impels them to venture out and encounter the hazards of the weather. These losses may to a considerable extent be avoided, by feeding them exclusively in the evening with a mixture of two parts meal, one part finely-pulverized potato starch, two parts pulverized sugar, and one part honey diluted with hot water. The meal and starch must be stirred in cold water to a thin and smooth paste, before the hot diluted honey and the sugar are added, that the mixture may not become lumpy. When this has cooled sufficiently to be barely lukewarm, take out a frame with empty comb, (if the bees are in a movable comb hive), pour the liquid food in the cells and return the frame, placing it as near as practicable to the combs containing the brood. If the mixture gets too cold to flow readily, add a little hot water and stir the mass well.—In common hives, the food thus prepared may be placed *under* the brood combs, in a shallow dish or feeding-trough, covering it with a perforated float. The bees will eagerly avail themselves of this resource; but it must be accessible to them only in the evening or at night, or they will be impelled to fly however unfavorable the weather may be. If fed during the day in common hives, strange bees would moreover be very likely to be attracted by the odor of the food, and robbing be thus induced.

If rye or oat meal cannot conveniently be procured, wheat flour will answer as a substitute.

But oat meal, as containing a greater propor-

tion of saccharine matter, is probably the best that can be used, and will be decidedly preferred by the bees.

The feeding of meal effects a considerable saving of honey, which would else be expended on the brood. Vast numbers of bees are likewise preserved by this process. Having within reach ample supplies of this excellent substitute for natural pollen, they remain contentedly at home, and thus escape the dangers to which they are exposed, if required to go abroad in quest of what they need.

It has been ascertained that when the weather is favorable and the bees are fed in the open air, a strong colony will carry in about three pounds of meal, before the catkins and blossoms become available. But when these latter can be resorted to, the meal-troughs or boxes are immediately forsaken—the natural product being preferred to all artificial substitutes.

GRAPE SUGAR.

Grape sugar is now extensively manufactured in some of the cities on the Rhine, for the purpose of *gallicising* the wines of that region. The use of it for feeding bees has latterly been recommended; and I procured thirty pounds of it last season to test its value. The result induces me to think that it may be resorted to with decided advantage, when it becomes necessary to feed bees; and for the following reasons:

1. Grape sugar can be obtained at a much lower price than cane sugar.

2. While it is equally as nutritious as cane sugar, it is naturally better adapted to the constitution of bees, as it forms the chief ingredient of honey—being commonly called honey sugar.

I fed it dissolved in barley water, and also in its raw state, as it comes from the factory, only slightly moistened with water. In this latter state bees consume it slowly, without such waste as occurs when feeding candy; wherefore, I regard it as better and more economical than that article, for winter food.—Dönhoff.

C. F. Dieterichs states in the German Bienenzeitung, that he saw Italian bees gathering honey from the blossoms of red clover, in the summer of 1858; but as the season was a very dry one, he thinks the heads were somewhat smaller than usual. He, moreover, found them frequently on flowers which are generally visited by humble bees only; and thence conjectured that the Italian bees have a longer proboscis than the common kind.

BEE LAW IN FRANCE.

Civil Code, Art. 524.

1. The owner of a swarm of bees has the right to pursue and reclaim it, provided he follows it when it issues from the hive and leaves his premises; otherwise it belongs to the proprietor of the ground or property, to which it resorts and clusters.
2. A swarm discovered flying in the air, and not yet pursued by any one, belongs to him who first sees and pursues it.
3. Stocks of bees are exempt from taxation, and are not subject to levy, execution, or sale for taxes, imposts, or duties, or for debts or liabilities of any kind whatever.
4. Bees are not to be disturbed or annoyed, but must be allowed to carry on their operations in peace, with liberty to fly and forage where they please. The removal or transportation of stocks from one place to another, is permitted only in the months of December, January and February.
5. When a beekeeper sees that a swarm is issuing from one of his hives, he is bound to announce the fact to his neighbors and others, by making an outcry or noise; and he must immediately follow and secure the swarm, if it leaves his own premises. But in so doing, he is not permitted to scale walls, or break down fences. If he causes any damage when securing, hiving, or recovering his swarm, he is bound to make satisfactory compensation to the injured party, before he removes the swarm.
6. Stocks of bees purchased by the owner of real estate, to be used in practical bee culture on his premises, are to be regarded and treated as fixtures belonging to the property. If the real estate be sold without an express reservation of the stocks, in the conditions of sale, they belong to the purchaser, and cannot be removed without his consent.

☞Special occasions or occurrences sometimes come opportunely, to induce us to re-discuss practical subjects; because, when topics have been thoroughly investigated by us, and definitely settled in our own minds, we are apt to forget that others may still need and desire information respecting them.—Berlepsch.

☞In thirty-six school districts, in the diocese of Brünn, in Moravia, there were in 1859, five thousand six hundred and fifty beekeepers, with an aggregate of 22,591 colonies of bees.

[For the Bee Journal.]

Bees:

WATER ESSENTIAL TO THEIR PROSPERITY.

The fact that bees require great quantities of water in the spring and fore part of summer, or during the production of larvæ, seems to be quite overlooked by most apiarians. That such is the fact, any one, by taking a little pains in the spring season, can readily ascertain; and there exists no doubt in my mind, that a proximity to water has much to do with the prosperity of bees. What the effect would be to have no water within the ordinary range of their flight, is not known, but probably it would seriously affect their prosperity, if they were obliged to fly a long distance to procure it. From observation I find that bees prefer to suck up water from low mossy places, or from the mud on the shores of streams. The reason probably is, that in such localities the water is warmer; and then again it is easier of access, as they evidently do not like to descend the perpendicular sides of any object to obtain that element, from fear of falling in.

Anything that prevents or retards the proper development of larvæ, acts as a check upon their prosperity, therefore the apiarian should endeavor to facilitate those operations that come within the range of his ability. When swarms, by location, are cut off from a near supply by natural causes, it should be furnished them in some way. A shallow trough or pan is as good as anything, if fixed in such a manner that bees will not be apt to fall in, as they will be likely to if precautions are not taken against it, especially in the early spring when high winds prevail. A good plan is to place small stones in the vessel containing the water, or a perforated wooden float.

There is one fact connected with the honey bee, that I have never seen noticed by writers upon bee culture; and that is, when following their natural instincts in selecting a home in the forest, they invariably select a tree within a few rods of water in some shape—a stream, pond, swale, or low ground where water stands in the spring. I have found and have had knowledge of the situation of some forty-five wild swarms, and only one out of the whole number but what had selected a home where water could be obtained, at least in the spring, within six rods of the tree. Having often noticed that to be the case, I took considerable pains to get information in regard to it, by inquiring of those finding wild bees, and often going to see for myself, and always with the same result, with the exception of the one solitary case above mentioned, and that was but a meagre swarm, evidently under a bad government, there being but few bees and very little honey. It may be argued that trees are more apt to grow gnarled and hollow in wet situations, and the bees find such by mere chance. It would be very singular, indeed, if that were the case, for many of the above swarms were found in hard wood growth, where hundreds of hollow trees, equally as suitable as those chosen, might have been found, but remote from water; and it is curious that such should *always* be passed by, and chance lead them near water. I believe that bees *generally* have a home selected before departing from the parent hive; and that situations in close proximity to water are *purposely* chosen; which is conclusive evidence in my mind, that bees in a domesticated state should be furnished, in some way, with a full supply of fresh water, during the season of rearing brood, if the natural facilities for that purpose are not adequate to their wants.

Andover, Me. FRYER, Jr.

[For the "Bee Journal."]

About the middle of February, of this year, in examining a hive of Italian queens, I found in two or three of the central combs, a quantity of sealed drone-brood in *worker* cells. The groups were about the size of a silver dollar each, and I think were on both sides of these frames. I also found one mature drone among the other bees, about the size of a large worker, which I suppose issued from a worker-cell. It was the smallest drone I ever saw.

The queen was a young one, placed in the hive about September last, and consequently not more than six months old. Unless there has been a casualty during the winter, she was the mother of most of the bees in the hive.

On the 2d of March, I caught an Italian drone just as he was entering another hive of Italian bees. He was about the usual size, rather smaller if anything. The guards at the entrance of the hive, seemed a good deal surprised to see him. They caught him and treated him pretty roughly at first, but they finally let him go, and he entered the hive rejoicing, no doubt.

I saw my Italian bees bringing in pollen this year, on the 2d day of March.

Hulmeville, Pa. C. W. TAYLOR.

☞It has been observed that *drone* brood will be killed by a degree of cold, which does not injuriously affect *worker* brood.

☞Please send us the names of beekeepers.

The Italian Bee.

BY THE REV. GEORGE KLEINE.

(*Fourth Article.*)

I endeavored, in the two preceding articles, to enumerate the traits and qualities which, from observations made and results obtained during the past ten years, entitle the Italian variety of the Honey Bee to claim a preference over the common kind. The advantages which *scientific* bee culture has derived from the introduction of this bee, are universally conceded. Not a whisper of doubt in this regard, has ever been uttered in any quarter. But as regards an acknowledgment of its importance and significance, so far as *practical* bee culture is concerned, the case is different. Though it cannot be denied that, in this particular, superiority has been claimed for the Italian bees on many points in which they do not surpass the common kind, it is nevertheless demonstrated that they do possess peculiarities and properties which elevate them so far above the latter, that, if we would be just, we cannot deny their evident superiority.

The question, whether the Italian Bees are of *practical* value, has been largely discussed. It was expected that it would be decided at the German Apiarian Convention held at Düsseldorf in 1855, but was postponed till the meeting of the Convention at Güstrow in 1856, where, decision being still considered premature, it was again postponed till the meeting at Dresden in 1857, where it was once more made a subject for discussion.

The Baron of Berlepsch had expressed previously the opinion that, though the newly introduced variety of bees was *indirectly* of great practical importance, as a means of solving some of the most difficult scientific problems—thus elucidating theory, and *thereby* giving practical operations a more stable basis, it was in other respects of no direct practical value. But at Dresden he assumed higher ground and asserted that, apart from its peculiar markings, the Italian variety "is not worth a charge of gunpowder," though he acknowledged unhesitatingly, that it is more industrious and placable.

Dzierzon replied that, other conditions being the same, superior industry obviously implied greater productiveness; and that the conceded placable and gentle disposition of these bees, must necessarily exert a most decidedly favorable influence on the extension of bee culture. But the question whether this or that race or variety be preferable or more profitable, could not be decided on theoretic grounds or by *a priori* reasoning. Close observation and long experience alone could determine the point. The results of experience, however, have already been clearly transmitted to us by the ancients; who, confessedly deficient as *theorists*, were unquestionably good *practical* apiarians, and most unequivocally preferred the Italian to the common bee.

Count Stosch, of Manze, in Silesia, after remarking that by careful selection and breeding, it was doubtless possible to produce a more beautiful, more constant, and, perhaps, more profitable race than the original Italian, proposed to subdivide the question respecting its practical value, and inquire, first, whether it is of practical use *at present*, and in the existing condition of bee culture? and, secondly, whether such utility is absolute and perdurable?

On the first point, he remarked that the demand for Italian bees is at present extensive and urgent. It is easier now to sell ten colonies of these, than one of the common kind. He who wishes to find a sure market, must cultivate Italian bees, even if it were true that, intrinsically, they are of no special practical value. He who would sell his wares, must adapt them to the prevalent taste and the fashion of the day. This is an arbitrary, absolute, and inflexible commercial axiom, as applicable to bees as to any other mercantile commodity. The fancy and whims of the purchasers, must be always taken into account.

As to the second point, he suggested that since the superior industry of the Italian bees was conceded without question or controversy, and the Baron of Berlepsch did still not admit that they produced more honey, the adverse opinion, as to results, must be grounded in some error or misconception. Comparative observations had, perhaps, not been made with sufficient care, or the products not accurately weighed; for, certainly greater assiduity in labor, persisted in through an entire season, must exhibit corresponding results at the close of the year.

It has been attempted to counterpoise the admitted superior industry of their bees, by their alleged greater disposition to build an undue proportion of drone-comb. But, according to his experience, the benefits derived from the former quality, greatly overbalances the supposed disadvantages resulting from the latter—especially when it is borne in mind that, in movable frame hives, the beekeeper can effectually restrict or control the production of drone-comb.

Again, if the fact noticed by the Baron of Berlepsch, that the greater number of his Italian queens died before completing their first year,

were corroborated by the uniform experience of others, then, indeed, the Italian bees would not be worth a stiver. He would concede, that the Italian queens do not attain to so great age as common queens, though, on the average, his own survived more than two years; and the alleged fact stated by the Baron, had wholly escaped the keen observation of Dzierzon. Yet, even a duration of life limited to so brief a period as two years, would be a grievous objection to the Italians, were it not the direct consequence of their superior fecundity. The greater alertness and industry of the workers produces a greater general activity within the hive, in turn exciting the queen to more frequent and regular egg-laying—thus reciprocally stimulating the gathering impulse in the workers, and the procreative impulse in the queen. An Italian queen lays fully as many eggs in two years, as a common queen does in three; and hence her vital energy is more severely taxed, and becomes exhausted at an earlier period. But, as a hen which would lay three eggs in two days, would be worth more than one which would require three days for the same purpose, even though the former should live only two years, and the latter should get to be six years old; so an Italian queen, though more short-lived, will be of greater practical value than one of the common kind, whose prolificness is notoriously small after her third year.

Finally, the mild and placable disposition of the Italian bees, is a most obvious advantage, commending them *feelingly* to our favorable consideration, and well calculated to render bee culture a more satisfactory and agreeable employment. Hence, after all that has been said, *pro* and *con*, it does not seem to be of much consequence to decide now, whether the Italian race is of high general or permanent importance; whilst this much, at least, appears to be certain, that it is decidedly valuable for practical purposes. And he could not, therefore, refrain from expressing the hope, that the culture of these bees may be prosecuted with the same zeal, and the same assiduity as hitherto, and be crowned with eminent success.

The general expression of concurrence in the sentiments of Count Stosch, elicited from the Dresden Convention, warrants the inference that the superiority of the Italian bees was fully recognized and endorsed by that assembly—as was likewise more clearly shown subsequently, by the more extensive introduction of this variety in the apiaries of Germany.

The general diffusion of the Italian bee, is certainly attended by numerous difficulties. It was soon found to be impracticable to send entire colonies in large hives to distant points, as, apart from the expense, it in most instances involved the total destruction of the stocks, from careless and awkward handling. Dzierzon devised a more efficient mode, by placing a queen with a few hundred workers in a small box containing sufficient stores, and transmitting them by express, to those who desired to be supplied. The queen and her attendants were then introduced in a colony of common bees, previously deprived of their queen. By these means the new race was speedily established in all the more important sections of the country, and thence distributed in every direction. Dzierzon originally fixed his charge for a queen thus prepared for transmission, at ten dollars—a very moderate price, indeed, when the risks and labor involved in rearing queens, are taken into consideration. Yet some narrow-minded persons affected to regard it as exorbitant, and thence took occasion to traduce him, instead of applauding his readiness to aid others in procuring that which most of them turned to a source of pecuniary gain.

The introduction of an Italian queen among common stock, proved to be far from being so easy and uniformly successful as had been anticipated. I will not weary my readers with a rehearsal of the lamentations which arose in every quarter, over the mishaps which attended even the best planned processes, and disappointed the calculations of sanguine beekeepers. Still, it must not be supposed that the introduction is surrounded with insuperable difficulties. Hitherto, I have not myself been unsuccessful in a single instance, if, after depriving the common bees of their queen, allowing them to build royal cells, and destroying these when they were capped, I placed the Italian queen in a cage, closed the orifice with a thin scale of wax, and suspended it among the bees, between the combs. The bees invariably liberated the queen, and accepted her with evident gratification.

But if we would be altogether sure of success, the queen and her companions should be transferred from the transport box into a hive that is furnished with combs containing a liberal supply of honey. Then insert a small piece of comb with capped brood nearly mature. The bees will immediately take charge of this; and as the young bees emerge and strengthen the colony, additional brood comb should be inserted, and the process repeated till the requisite amount of population has been obtained. When this point has been reached, the apiarian has it in his power to multiply stock to any extent that may be desirable, or the state of his apiary may permit. His chief object must be to secure the production of an early and ample supply of Italian drones. This can be

best effected by means of a populous and well stored colony; and if that which contains the Italian queen, do not possess these qualities early in the ensuing spring, it should be fostered and aided by the introduction of capped brood-combs, and combs with honey and pollen—all of which may be taken from common stocks.

As soon as the Italian drone-brood is capped, the process of rearing queens may be commenced. The earlier this can be done after the drone-brood has reached this stage of development, the more confidently may we depend on maintaining the purity of the race, because the queens reared will be fecundated before common drones make their appearance. The suppression of the latter should be constantly aimed at, and can always be effected, to a large extent, where movable comb-hives are used. It is advisable to make a large number of *nuclei*, even though they be small and weak, because these give us a choice of queens, and enable us to select the brightest and best specimens for introduction among common stock designed to be Italianized, or for the supply of any artificial colonies we may desire to form.

Genuine Italian queens may still be reared in the latter part of summer, by purposely keeping some colonies in a queenless condition, so that their drones may be preserved, when those of other colonies are destroyed. But pure stock may be obtained, even while common drones abound, if the young queen and the Italian drones be incited to fly simultaneously at times when the former do not issue. By feeding the Italian stocks with honey warmed and somewhat diluted, two or three hours before the common drones usually fly, or after they retire for the day, our object may in most cases be attained.

If we have ordinary success in rearing young queens, and the weather be sufficiently favorable to allow them to make their excursions, and they are fecundated by Italian drones, it will be an easy matter to Italianize the largest apiary in a single season. This should be the aim and endeavor of every apiarian who, in addition to a source of pecuniary profit, wishes to provide for himself an unfailing fountain of innocent enjoyment. We should ever remember, that if bee culture is to be successful in the hands of any one, it must be prosecuted with zeal and devotion. He must learn to love and admire his bees, and to find in them and their management, ever-renewed and diversified topics of interest; nor can he derive greater gratification from any branch of his darling pursuit, than from the propagation and cultivation of the Italian race.

☞*Please send us the names of beekeepers.*

[For the "Bee Journal."]

EARLY SPRING MANAGEMENT.

I pursue the following plan with my bees in the spring: As soon as the weather is sufficiently warm, I commence feeding them regularly with syrup made of refined sugar, in such quantities that they will store a little, and also give them access to as much rye meal as they will take, which I place in the open air in shallow boxes, sheltered from the wind. I prefer feeding the syrup in feeders, set in the upper part of the hive to prevent robbing, and close the entrance to about one inch—Feeding to be continued until fruit trees are in bloom, when it should be gradually discontinued. By pursuing this method, they will be stimulated to breed rapidly, and will be strong in numbers by the time they can find plenty of foraging. They will cast swarms from two to three weeks earlier, and when the honey harvest commences, they will be in a condition to reap the greatest benefit from it. Feeding, injudiciously conducted, is productive of more harm than benefit.

W. W. Cary.

[For the "Bee Journal."]

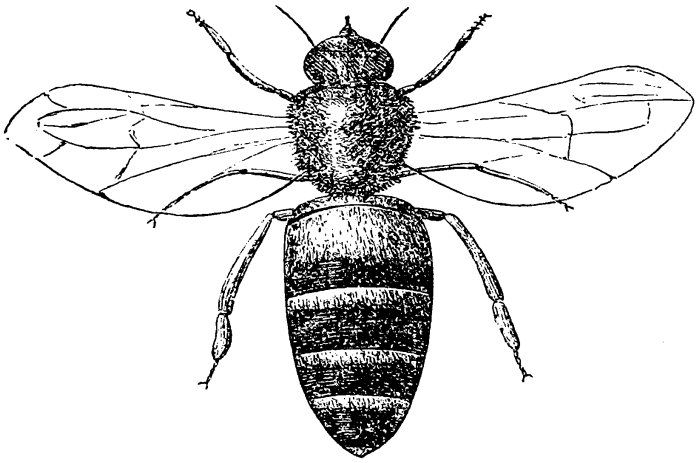
I was truly glad to hear that such a paper as the "American Bee Journal" is published in the United States, and no doubt it will be a welcome visitor to numbers of beekeepers—especially when there is so much humbugging in the shape of patent bee-hives, as there is in these our days.

I wish to make an inquiry to which I should be pleased to receive a reply through the Journal. As the Italian queens are said to be more prolific than common queens, should not the hives wherein they are put, be larger, in order to give the queens more room to deposit all their eggs; so that we could reap the largest possible profit from them?

New Hope, Va. J. F. F.

☞It is stated that Dr. Hicks, of London, has recently discovered that the prismatic corneal lens in the eye of the bee, is *a compound double convex lens*, precisely similar in principle and construction to one of the latest improvements in the microscope, for the correction of the aberration of light. It thus appears that this recent triumph of inventive genius was devised and employed by the Creator, long before man was brought into existence; for, according to Hugh Miller, (*Testimony of the Rocks,*) "the first bee makes its appearance in the amber of the Eocene"—the period which Geologists regard as the very dawn of the existing state of things.

☞*Please send us the names of beekeepers.*



The Italian Worker.

(MAGNIFIED.)

The above cut of the Italian Worker, shows some of its peculiarities. A portion of the two upper rings of the abdomen, is a beautiful orange-color, as represented by the unshaded part of the drawing. The rings of the abdomen are also more deeply fringed with hair, than the common variety, that is, the black bee. When seen in sunlight flying against a window, it is impossible not to be forcibly struck with their beauty, they being then almost transparent. The abdomen is longer and more pointed. This peculiarity of shape is often present in half and quarter-bred bees, even when one or both orange-colored rings are absent. When gorged with honey, their peculiar form is still more marked. The following statement from Dr. J. P. Kirtland will be of interest to the public, from his high reputation.

"1st. Their disposition to labor far excels that of the common kind. From the earliest dawn of day to the arrival of evening, they are invariably passing in and out of the hive, and rarely suspend their work for winds, heat, or moderate showers, at times when not a solitary individual of the common kind is to be seen. Two hours each day their labors are extended beyond the working time of the last-named kind.

2d. Power of endurance, and especially of resisting the impression of cold, they possess in a marked degree. Since the Buckwheat, Solidagoes, and Asters have flowered, the nights have been remarkably cold in this vicinity. This low temperature has, in a great measure, suspended the efforts of the common Bees, and they have been eating their previously accumulated stores. Not so with the Italians; they have been steadily accumulating Honey and Bee-bread, and rapidly multiplying their numbers. They seem to be peculiarly adapted to resist the chilly atmosphere and high winds, which predominate in Autumn, on the shores of Lake Erie.

3d. Prolificness they equally excel in. Both my full and half-blooded stocks have become numerous and strong in numbers as well as in stores, at this late season of the year, when the common kinds have ceased increasing and have become nearly passive.

4th. Their individual strength is greater, and this is well illustrated in their prompt manner of tossing to a great distance, any robber that may chance to approach their hive.

5th. Their beauty of coloring and graceful forms, render them an object of interest to every person of taste. My colonies are daily watched and admired by many visitors.

6th. Of their moral character, I cannot speak favorably. If robbing of weaker colonies is going on, these yellow jackets are sure to be on hand.

So far as my experience has gone with them, I find every statement in regard to their superiority sustained. They will, no doubt, prove a valuable acquisition to localities of high altitude, and will be peculiarly adapted to the climate of Washington Territory, Oregon, and the mountainous regions of California."

We have seen testimony from Rev. L. L. Langstroth, Mr. Wagner of York, Pa., E. A. Brackett, the sculptor, M. M. Baldridge, apiarian, of Middleport, N. Y., and from other equally reliable sources, which corroborates the above statement from Dr. Kirtland.

The Italian Bee is less inclined to sting than the common variety. It has been widely circulated by advertisement, that "THEY WILL NOT STING." This statement is altogether untrue, and we can not imagine how any one can be so weak as thus to expose himself, when detection and exposure cannot be escaped.

New York. E. P.

☞He who would become a thorough beemaster and successful beekeeper, must, first of all, study the theory of bee culture, based on a knowledge of the nature and habits of the bee. It is only thus that he can familiarize himself with the principles which are to guide and govern his practical operations. The whole subject will be clearly expanded before his view; and he will, in any case and under any circumstances, be able to decide what is proper to be done, and when to do it. Whereas, the mere empiric can never become a successful operator, though furnished with the most minute instructions; because it is impossible to foresee all the contingencies that may arise, or the peculiar phases which may present themselves in any special case. Difficulties will have to be encountered at almost every step; and he will perpetually be liable to make mistakes—discovering his blunders only when it is too late to apply a remedy. Hence, one who is himself a master, has emphatically said—"STUDY THE THEORY, if you would not remain *a bungler all your life!* PRACTICE is nothing else than APPLIED THEORY."

☞The Favignanese apiarians call artificial colonies *babies.*

Notes on Humble Bees.

BY DR. DÖNHOFF.

In all treatises on Entomology we are taught that there are two descriptions of workers among humble bees, and also two sizes of males or drones. This seemed to me so remarkable that I was induced to employ some school-boys to procure for me a number of humble bees' nests last summer. Nine of these I placed in small Dzierzon hives, that I might conveniently observe their habits and operations.

I found that there are not two kinds of workers differing from each other in size, nor two different kind of males; but that there is no uniformity of size whatever among either. They are all alike in kind, though varying in size from that of a common hive-bee to nearly that of a queen—the differences in size being almost infinite. I ascertained that this was the case alike with the *Bombus lapidarius*, the *Bombus terrestris*, and the *Bombus musscorum*. From one and the same brood mass workers of all the various sizes emerge. As the larvæ are crowded together promiscuously in the mass of pollen paste, the different degrees of development in size to which they severally attain, depends on the amount of space which falls to the lot of each. One is, of course, under such circumstances, more compressed and circumscribed than another, and its growth is correspondingly impeded or checked—just as in the case of hive bees, the workers are produced in narrow cells.

Prof. Leuckart and Dr. Küchenmeister conjecture that the sting of the queen bee discharges some important function in oviposition. On the 6th of July last I saw a humble bee laying eggs. I observed her nibbling with her mandibles at the edges of an opening in a brood mass which contained some eggs. She then inserted her abdomen in the opening. In a few seconds she extruded her sting which remained motionless three or four seconds, when she retracted it, withdrew her abdomen, and closed the opening in the brood mass by drawing together the edges of the pollen paste, with her mandibles.

On the 2d of June, I removed the queen from a nest of humble bees. The bees showed no symptoms of being conscious of their queenless state.

On the 7th, I found that a new royal cell had been started. I opened it, and finding it contained eggs, I closed it again with pollen paste. A few weeks later young bees emerged from the cocoons in the pollen paste. They were exclusively workers. The bees continued brooding all the summer, but produced males only. The males seem to be distinguished externally from the workers only by the shape of their antennæ, which are curved and resemble drone-antennæ in general.

Oken says, "as the humble bees seldom carry in pollen, though they use it in preparing paste for their brood, they must eat it while abroad and again disgorge it in their nests." This is altogether a mistake. In the summer season, when they have most brood, the humble bees may often be seen carrying in pellets of pollen; and on such occasions, if I waited till a bee had reached the nest, I always found, on examination, that she stripped off the pellets and attached them to the brood mass with her mandibles. The paste of which the brood mass as well as the honey-pots are formed, is simply this pollen paste, made of the pellets which they collect on their thighs. It soon becomes brown and glossy, just as pollen does superficially in the cells of the honey bee. This results from the exudation of an oily substance which the pollen contains. Probably this oily matter liquifies in process of time, by absorbing oxygen from the air, as may be inferred from the fact that fluid oils are more highly oxygenated than fixed oils; and that the change of color is only superficial. If pollen be placed on a sheet of paper, a grease spot will in a few days be found under it, and if a piece of brood mass or a honey-pot from a humble bee's nest be placed on paper and laid on a warm stove, a large grease spot will immediately be produced. Oken thinks that the paste of the honey-pots differs from that of the brood-mass, and calls the paste of the former *demi-wax*, and that of the later *wax*. In this he is certainly wrong.

The bee moth very frequently deposits her eggs in the nests of the humble bees; and the emerged larvæ subsist exclusively on the pollen paste. I found over twenty bee moth larvæ in the pollen paste with which the workers had over-arched their nest below the covering of moss under which it was situated. These were orange-colored. The color was doubtless derived from the pollen paste which they had devoured—the coloring matter being liberated during digestion, and secreted in the skin.

I daily examined my humble bees' nests, looking for dead humble bees. I found some on ten occasions, and on dissecting them invariably discovered a large larvæ, completely filling the abdomen. It was apodal, and when warmed moved like the larva of the bee moth. In two instances I succeeded in severing the abdomen without injuring the larvæ. In a few days these were transformed into chestnut-brown *pupæ*, which have not yet emerged. They appear to be the pupæ of some species of fly. The parent insect must deposit the egg by inserting its ovipositor between the rings of the abdomen, and the humble bee perishes about the time when the larvæ attains full growth, and is ready to enter its pupæ state.

WEIGHT OF A SWARM OF BEES.

☞We occasionally find such crude articles as the following in the newspapers:

"WEIGHT OF A SWARM.—It is estimated that a full swarm of bees weighs eleven to twelve pounds. Hence, all excess over that is honey and comb, so that the quantity can be ascertained by weighing the hive, if the weight of that is known, as it always should be, and marked upon it when new."

We suspect that he who suggested this, never made a practical application of it, or the result would have convinced him, that his rule is rather the exception than the norm. In the first place, he appears not to have adverted to the fact, that the weight of some hives will be considerably increased by the absorption of moisture after a swarm is introduced, and will also be somewhat affected by the quantity of propolis used. In the second place, he makes no reference to the pollen which the bees store away in the cells. And in the third place, the weight of the brood is altogether left out of the account—though a strong, healthy colony is rarely without any, and at times it constitutes a highly important item. At a period when the queen's power of ovipositing is by no means inordinately tasked, she lays 2000 eggs per day; and there will then be at one and the same time 10,000 larvæ and 32,000 pupæ or nymphs in the brood-cells. A larva just hatched, weighs the three-hundredth part of a grain, and three grains when full grown. The average being 1½ grains, the larvæ weigh 15,000 grains. The average weight of the pupæ or nymphs is 2¼ grains, and the 32,000 in the capped cells weigh 72,000 grains. The aggregate weight of the brood will hence be 87,000 grains, or 11½ lbs. avoirdupois. To this, add 3 lbs. for pollen, and 1 lb. for increased weight of the hive from imbibed moisture, with an allowance for propolis, and we have a total of 15½ lbs. which, under the above process, would have to be set down as "honey and comb," to the no small disappointment of the sanguine beekeeper, who should undertake to *realize*. The amount of brood in a hive, it is true, is a variable quantity, fluctuating probably from half a pound to eighteen pounds, according to season and circumstances. But the above rule is absolute, having no reference to contingencies; and we wish simply to hint that there are, at times, "more things" between the bottom board and the apex, top, or honey-board of a hive, than are "dreamt of" in the "philosophy" of some folks.

What is the impulse that causes workers to construct royal cells in a hive which has a vigorous fertile queen?

[For the "Bee Journal."]

I thought of engaging in bee culture, but having had an unfortunate beginning, I feel discouraged. Perhaps it was my ignorance of the proper management that was the cause.

I procured a swarm in June last, which I put into a Langstroth hive. By fall the hive was filled below, and had fifteen pounds of honey in the comb in the upper story, which I took and used in the family. The bees are doing well, and this encouraged me.

I then procured colonies where the owners intended to kill them, and with comb put them into hives, and fed them. They appeared to do well till about the first of January, when all perished. I thus lost four colonies from some cause unknown to me, as they had honey in their hives. Perhaps they were frozen, or needed something more than honey to keep them alive.

I intend, however, to try again.

Urbana, Ohio. J. F.

[For the "Bee Journal."]

I put into a *bee-clamp*, twenty-four stands of bees on the 24th of November last. The temperature within, this morning, (Feb. 25th,) was 38¼°, outside 22°. Three of the four vent holes I stopped. Yesterday with the four vent holes open, the temperature inside was 34°, outside 24°. Lowest temperature inside this winter 34°, highest 44°; generally from 37° to 39°.

I shall take them out in about three weeks, and let you know how they come out. This has been an extremely bad winter for bees. I have lost one-fourth of my stocks that I wintered out.

Milford Center, Pa. R. P. M.

[For the "Bee Journal."]

In 1859, I divided a swarm of bees, placing the queen with three frames of brood and bees in a new location. A few evenings after, the bees became very much excited, pouring out of the hive and making the peculiar noise indicating the loss of the queen. I at once placed in the hive a comb containing a queen-cell sealed, and the bees immediately became quiet. Next morning, a dead queen was found at the mouth of the hive; the queen-cell vacant, and open on one side. The swarm did well, having a prolific queen. I have had two similar cases since. Can any of your correspondents explain the cause of the commotion in these hives?

Providence, R. I. J. C.

Does the queen bee ever deposit an egg in a royal cell?

[For the Bee Journal.]

Breeding in-and-in.

The system of "breeding in-and-in" is generally conceded, I think, to be highly deleterious to a species—human, animal, fowl, or insect; and it is found that vegetables "run out." But who has thought to practically apply the principle to bees, or supposed that it would apply to that profitable insect, causing it in the least to deteriorate?

Much care is now taken in the breeding of neat stock, and horses, sheep, swine and poultry. But who does the same with bees? Or who supposes that the laws of nature are not as inexorable with bees, as with cattle, horses, swine, or poultry? Yet they are just as true in the one case as in the other. May not much of the deteriorated and diseased condition of bees, be attributed to long continued breeding in-and-in? I am not prepared to answer positively; but from near thirty year's experience, I am strongly inclined to think that this may be so. I find in all sections in which I travel, that bees "run out." On inquiry, I generally learn that a "long time ago," they did well, but "somehow of late years they haven't done as well, or done much; don't know what the cause is." On asking how long they kept the same stock of bees, some say twenty years, some twenty-five, some thirty; some had them from their fathers or grandfathers. Inquire whether any pains were ever taken to improve the stock, and the reply is, "No!"

In cases where neighbors have kept bees near by each other, I generally find better stock, or where bees have been procured from such neighborhoods. Also, wild bees, when procured, I notice are more vigorous than tame ones. I am informed by a successful apiarian, that he has known wild swarms placed in an apiary of from ten to fifteen swarms, and in three or four years they had possession, the others having dwindled out.

A few days since, I fell in company with one of two brothers, living but a few rods apart, whose bees I had noticed to be better stock than the average. I inquired how long they had had them. He replied, about forty years. Have they always done well? Yes. I spoke of the benefit of crossing. "Well, said he, there may be something in that. The first swarm I had, I found; and since, I have frequently found wild swarms and placed them in my apiary."

Within a recent period, I had an opportunity to examine some twenty-five or thirty stocks diseased with "dead-brood." Such of these as I can trace, I trace to apiaries that have been conducted for years on the breeding in-and-in system. Some time last summer, I had the curiosity to examine combs containing dead-brood. Where not too far putrified to show its position, I found it rear end outwards towards the cap. I have since examined several, with the same result.

I wish to hear from others, on this and other points; and to have apiarians who have opportunity to examine with reference to putrid dead-brood, its position, and the position of the eggs in hives that have dead-brood; the appearance of the queen, and whether she is young or old; and whether from swarms or apiaries that are old, and have been bred in-and-in. I would likewise suggest putting in, for experiment, queens that have not had dead-brood, instead of those that have, after pruning out such comb as has dead-brood. I have practised this pruning, but the same difficulty kept occurring, with no improvement than to keep the swarm along a little longer. From my recent observations, I am inclined to think inability on the part of the queen to place her eggs properly, or on the part of the larva to assume its proper position, is the cause of the disease.

New Britain, Conn. C.

[For the "Bee Journal."]

How can a person unite two swarms in the fall, without danger of being stung, and without the bees fighting? It is said that two swarms so united, will winter on about the same amount of honey that one of them would have needed. I should like to have this inquiry answered through the Bee Journal.

Warren, N. H. W. F. E.

[For the "Bee Journal."]

I have in use the Langstroth hive, and use his movable comb frames. I wish to inquire what number of frames should occupy a given space, and the distance from each other to the centre of the outside frames. I have "*Langstroth on the Hive and Honey Bee*," second edition, and on page 482, I find the width of one hive that he recommends to be twelve inches, with eight frames; and on page 483, he recommends 14⅛ inches for the side width, with ten frames. You will thus perceive, that the two do not place the frames the same distance apart. I am inclined to think, that there is an exact distance that the frames should be set, from the centre of one to the centre of another. Hence this inquiry. I am making my own hives, and would like to avail myself of the experience of others who have had more and longer practice than I have.

What is the best implement to use to blow smoke in the hive, before opening and handling the bees or frames?

Enfield, Conn. G. T.

Cost of producing Wax.

How many pounds of honey are required to enable bees to produce a pound of wax? This is an interesting and important question. It has been frequently investigated, and the conclusions arrived at differ greatly.

Gundelach made some minute and careful experiments, the details of which are given in his "*Natural History of the Honey Bee*," and the results showed that about twenty pounds of honey were used by the bees, in producing a pound of wax. But, in his experiments, the bees were confined to the hive; the queen, also, was placed in duress, apart from the workers; and the latter were not supplied with pollen—which was not supposed to be needed for the production of wax. Thus the little colony was clearly in an abnormal condition, and the result showed only how much honey, bees, under *such* circumstances, require to produce a pound of wax.

A similar experiment, with like results, was made by the Baron of Berlepsch. In a subsequent experiment, he allowed the bees free access to pollen, and ascertained that, in such case, thirteen pounds of honey (exclusive of the pollen consumed,) sufficed to produce a pound of wax. But as here also the bees were kept confined, the result does not show how much honey is used by the bees for this purpose, in their free and unrestricted operations, at the season when comb is usually built—that is, when pasturage abounds, and the weather is favorable to their labors, in doors and out.

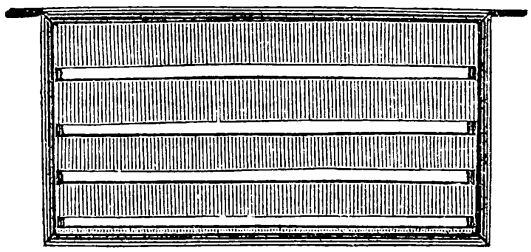
Again, Count Stosch, taking the second experiment of the Baron of Berlepsch, as the basis of his estimate, thinks due allowance should be made for the time spent in comb-building by the bees, and which, if devoted to honey-gathering, would have enabled them to store up at least twenty pounds. Hence he concludes that, with the actual consumption and the necessary allowance for time and labor, the cost of a pound of wax is fully equivalent to thirty pounds of honey. This, in money value, at eighteen cents per pound, is equal to four dollars and fifty cents; whilst the wax itself, properly prepared for market, would not sell for more than forty cents—thus involving substantially a loss of four dollars and ten cents. From all this he infers, that the beekeeper cannot afford to melt down good and clean empty combs; and that the most profitable mode of disposing of them, whilst they remain in a condition acceptable to the bees, is to re-insert them in the hive on the removal of filled combs—thus saving the time, labor, and honey required for the construction of new combs. He further remarks, that his estimate is based on the operations of bees in *ordinary* periods. Whereas, if comb be built when pasturage is very abundant, time and labor being then more precious, the cost of a pound of wax is of course much greater, or fully equivalent to fifty pounds of honey. Hence he regards it as very important, or rather highly essential, that the beekeeper should be so situated as to be able to supply his bees with empty combs *ad libitum* while pasturage abounds; and induce them to build combs, if any be needed, only at times when the nectar of flowers is less plentifully yielded. It is at such times only, that wax can be produced by bees at the minimum cost. Bees will build freely and rapidly only when pasturage is abundant; but their labor might then also be more profitably employed. Besides, the weather may suddenly change and cut off their supplies, and they may find themselves in the position of having spent honey and time in the construction of combs, which they are subsequently unable to fill. But if their energies had the while been wholly devoted to gathering honey, and their stores garnered in combs supplied by their owner, their store-house would have presented a different and far more gratifying spectacle. If, afterwards, pasturage should continue to be only moderately abundant, a portion of the full combs may be removed, to give the bees an opportunity to build new ones. This would check their disposition to swarm, and prevent them from idling away their time, from want of storage room. If, in the end, from unfavorable weather, they fail to build comb, or are unable to garner additional supplies, their preservation during the winter may easily be secured by restoring to them some of the full combs previously removed.

This is, no doubt, a judicious process, deserving of imitation; but still the Count's estimate of the cost of producing a pound of wax, is evidently somewhat exaggerated; for he does not take into consideration that the nectar of flowers, as gathered by the bees, is not precisely in the condition of what is known as honey. It contains so great a proportion of mere water, that it must lose one fourth of its weight by evaporation, before it attains the proper consistency to be called honey. Again, comb-building is to a great extent carried on at night, when bees do not leave their hives to forage, however abundant the pasturage may be. During the height of the gathering season, moreover, honey is more quickly converted into wax than at other periods; and consequently the alleged loss of time is, doubtless, less than he assumes. Nevertheless, making due allowance, the cost of producing a pound of wax is manifestly greater than the Baron of Berlepsch rates it; and probably fully as high, if not higher, than the original estimate made by Gundelach.

Artificial Comb Guide.

An Illinois correspondent inquires whether there is "anything later than what is contained in the second edition of '*Langstroth on the Hive and Honey Bee*,' in regard to keeping the comb from deviating from the frame," and suggests a plan which he thinks might answer the purpose.

We doubt whether what he proposes would prove successful, as we have known an expedient nearly similar, fail on trial. The only efficient comb guide yet introduced, that has come under our observation, is one invented by Mr. Richard Colvin, of Baltimore, constructed as shown in the following cut.



This has been in use several seasons, and has, we believe, invariably caused straight combs to be built, in the hives in which it was employed. We have seen a number of large sized combs, built under constraint of these guides, which, for straightness and uniform thickness, precisely adapted to worker-brood, much surpassed those constructed by bees left to the operation of their own whims.

The guides consist of partitions as represented above, of the same length and depth as the comb frames. They may be made of tin, wood, or other material. Though tin is somewhat expensive, (25 cts. each, or $2.00 per set,) yet it is preferable, as it takes up less room than wood. The guides are made of slats; and if of tin, with a bead around the edge, to keep it straight and out of wind. The slats are placed about three-eighths of an inch apart, and are about 1⅝ inch in width. The *top* one, including bead, two inches.

In using these guides, if of tin, one frame only need be removed out of the hive, to give the requisite room. If of wood, three-sixteenths of an inch thick, two frames must be taken out, leaving only eight in the hive. Then set the two outside frames in their proper places, and the other eight or nine, (as the case may be,) equidistant from each other, so as to fill out the intermediate space; and next, hang one of these guides exactly in the centre between each two frames. The sides of the hive should be set perfectly level with each other; and care should be taken to see that both guides and frames hang plumb, before the swarm is put in, as well as afterwards. When it is placed on a *level* stand, raise the back end of the hive about two inches. Let the guides remain in, till the bees have filled all the frames with comb; then remove them, shove the frames to their *proper* places, and put in the frame or frames which had previously been removed—placing them near the centre of the hive, and each between two combs containing *brood.* When in that condition, the bees will not elongate the cells, and *must*, consequently, build straight comb in these empty frames also; and they generally do it, at the height of the honey season, in about two days.

Beekeepers using the Langstroth hive, and living in territory belonging to Mr. Colvin, or Mr. Langstroth, have the privilege of using these guides free of charge.

[For the "Bee Journal."]

WINTERING BEES.—ITALIAN BEES.

I put out all my bees on Wednesday, February 27th. Four days of warm weather succeeded. On the last two, they obtained pollen from the "Candle Alder."

I have not been so well pleased with any plan for wintering bees heretofore, as with the success I have had in storing them in a dark room, the past winter. My neighbors, who wintered theirs in the usual way, lost a large number of their late swarms of last season, and find the surviving ones much weakened. A friend, who wintered eleven or twelve stocks on their stands, in the Langstroth double glass-cased and frame hives, had his bees suffer severely from freezing and dampness. He left the honey-boards on, but opened half the holes for the eseape of moisture. It would probably have been better, if he had removed the boards; but then they might have suffered from freezing.

I have been quite surprised in my experience with Italian bees, at their success compared with the common. I could not credit the report of their great superiority, as in everything they seemed so like our common bees, except in the coloring. I am now quite ready to believe, that their introduction into this country will not only greatly increase the interest in bee culture, but that they will be the means of greatly enhancing the profit of the apiary, with the same management.

Chester Co. Pa. L. P.

THE CLEVELAND CONVENTION.

☞ We intend giving a full report in our next issue, of the proceedings of the Beekeepers' Convention, recently held at Cleveland, Ohio,

Bees in Common Hives.

KRITZ'S METHOD.

Early in spring, select four stocks in common hives. They should be such as have wintered well, are of medium size, and are well supplied with honey and pollen. If they are already populous, prune off only the lower margins of the combs, and remove all the droppings from the bottom boards, or give them clean and dry ones.

Feed these stocks moderately every other evening, to encourage brooding, so as to have them strong and in good condition by the first of May, or a week earlier, if the weather be settled and moderate. Then for the sake of convenience, mark the stocks respectively A, B, C, D, beginning with the heaviest and most populous. As soon as the bees of A cluster outside and several hundred remain out over night, drum out a strong swarm, remove the parent hive to some other location, and set the driven swarm in its stead. Six or seven days after, when a number of royal cells have been started in A, transpose A and B, performing the operation at about noon, or when the bees are flying most briskly. The consequence will be, that A will at once receive a large accession of bees from B, and thus become as populous as it was before the swarm was drummed out.

As soon as the young queens rearing in A are mature, or in the course of from five to ten days after the transposition was made, a strong swarm will issue from it, fully equal in numbers and weight to an ordinary natural first swarm, and more valuable than a first swarm, as having a young queen. This swarm is to be set in B's place, while B is removed to the place now occupied by A, and the latter removed to where C has hitherto stood—C being transferred to a new location. A is thus again strengthened by bees received from C, and will send out another swarm on the second or third day after these changes were made. The swarm is to be set in the place now occupied by C, which is removed to a new location. A and D are now transposed. A will thus be once more reinforced—the accessions coming from D, and will in a day or two send out a third swarm, which should be set in any convenient place, because A, having rendered the service required of it, is not to be again removed.

The subjoined illustration may serve to render the process more intelligible.

Original arrangement of the hives:

After drumming out a swarm from A:

After the first transposition:

After A yields the first voluntary swarm:

After A yields the second voluntary swarm:

After A yields the third voluntary swarm:

Thus from one stock which furnished bees and queens, and those others which furnished bees only, we shall have obtained four seasonable swarms, all having come early enough to gather ample supplies for the winter, if pasturage be ordinarily abundant. True, B, C and D will not subsequently swarm. But it was not designed that they should, as we have already virtually taken one swarm from each.

The advantage of this method is, that it approximates more closely to natural swarming than any other mode of artificial multiplication, which can be adopted where common hives are used; since, of the four swarms obtained, only the first was produced by constraint. The other three are in fact voluntary natural swarms—the bees having simply been impelled to swarm sooner than they would otherwise have done; this effect being caused by the presence of early maturing queens, in the regularly reinforced colony.

What objections can be urged against this method, and what improvements can be suggested?

[For the "Bee Journal."]

I hail with pleasure the advent of the "*American Bee Journal*," which I have had the opportunity to peruse. It seems to be just the publication needed in this country; and while it maintains the position it has taken, it may rely on at least one working friend. Much of my time is spent among bees, taking care of, transferring, dividing, doubling up small swarms, driving, forcing, &c., for myself and others, both in and out of town, so that I have much practical experience, and opportunities to introduce the Journal, which I shall strive to do.

On page 4 of the January number, is an article about a dwarf queen, by Liebe. The eggs, properly placed by this queen, hatched; the others did not. What became of those not properly placed? Did they develop, and become dead-brood, or not grow at all? If there was dead-brood, which end was turned towards the cap?

In a similar case, which I had an opportunity to examine, an importer of Italian bees and seller of queens, received his ten dollars as per terms. The purchaser in due time received a *small* queen, "to say the least." On examining the comb that accompanied her, perhaps two weeks after her arrival, I found so-called dead-brood. Many of her eggs had hatched, but the larvæ did not come to maturity—dying in the cell, with the wrong end or rear end turned towards the cap. C.

☞The wrongly placed eggs noticed by Mrs. Liebe, did not hatch at all.

BEE GOVERNMENT.

Undoubtedly the GREAT CREATOR and WISE LAW-GIVER has instituted *a government* for the bees; yet the *swarm* requires no *leader*, nor the *colony* a *sovereign*. The *administration* is not committed to any one individual. To each member of the *community*, whether worker, drone or queen, is assigned a specific duty, task or function; and the disposition and desire to labor in its vocation is implanted into each, so that in their several spheres all co-operate for the general good—the welfare of the *commonwealth*. The queen—the mother bee—is, indeed, of the first and highest importance to the colony, but she is not its sovereign, nor in any aspect its guide, leader or governor. Impelled by the instincts of her nature, she performs her duties in the family, like every other bee, in accordance with her faculties and to the extent of her ability. Nevertheless, she occupies, on the whole, a subordinate station. *The supreme power resides in the masses.* Decision and action emanate from them as a body. Their will determines; their wishes rule. Though ordinarily they tenderly nourish and cherish, protect and defend the queens, drones and brood; yet when the prosperity or preservation of the colony demands it, they imprison, mutilate, expel or destroy either. From their arbitrament there is no appeal; their decree is absolute and subject to no reversal; and their power cannot be resisted.—BALDENSTEIN.

SUPERSTITION.

In the "Illustrated London News," it is stated that the following curious superstition prevails in the county of Durham, (Eng.) When the head of a family dies, who keep bees, after returning from the funeral, one of the family gives the bees a taste of everything partaken of at the funeral—such as wine, cake, cheese, ale, and even tobacco; for it is believed that, without this mummery, the bees will die. The origin of this silly custom is not known.

Late London papers contain the following:

"Nearly all the bees in the south of England have died this year. A person in the New Forest, who had one hundred and forty hives, has lost every bee."

☞The large number of communications which we have on hand, with other valuable matter, warrant us in saying, that the May number of the "Bee Journal" will be very interesting.

☞*Please send us the names of beekeepers.*

[For the "American Bee Journal."]

Suggestions

FOR

IMPROVING THE BREED OF ITALIAN BEES.

In breeding Italian bees, two points are of special importance. First, to prevent degeneracy; and secondly, to improve the race still further by careful breeding.

If Italian queens, when impregnated by common drones, always produced workers partly Italian and partly common, it would be easy in breeding, to reject all such queens. But unfortunately all the progeny of such queens, are sometimes *apparently* full-blooded Italians. Proof of this is found in the article on Italian bees in the first number of this Journal. I have, in my own apiary, two such queens reared from the original queens imported by Mr. Parsons, of Flushing, (N. Y.,) and impregnated some time before any Italian drones were hatched. If I had not known that these queens were impregnated by common drones, I might have sold them for full-bloods, or used them in rearing other queens. And there is reason to believe that, in Germany, queens of this character have been used as pure.

Prof. J. P. Kirtland, of Cleveland, (Ohio,) in a letter to me, says—"I reared three queens which were impregnated by common drones, the worker progeny of which present the features of full-blooded Italians, only in a less perfect degree. Such queens, I fear, will be palmed upon the public by dishonest dealers, as full-bloods."

"Dzierzon gives it as the only reliable evidence of the genuineness of a queen, that her royal daughters, fecundated by an Italian drone, produce Italian workers exclusively; and all good apiarians, engaged in rearing Italian bees, concur in this view." (See page 19 of the *Bee Journal.*) Now as drones will fly a mile or more to meet a queen, we cannot be *sure* that our queens are impregnated by Italian drones, until we have raised queens from them, and are sure that these queens are rightly impregnated!

I have, for some time, thought that a way might be devised for attaining complete certainty as to the kind of drone by which Italian queens have been fertilized; and this without the tedious delay required on any plan now known. On page 127 of "*Langstroth on the Hive and Honey Bee,*" and in the March number of this Journal, it is stated that the pursuit of the queen by the drones was witnessed, by fastening to the thigh of a young queen, a fine silken thread; and that the queen thus fastened was actually impregnated. In the same number of the Bee Journal, details are given of the impregnation of two queens so near the hive that, in each instance, *the impregnating drone was secured.* It would seem then that, by means of a fine silken thread, we may succeed in having young queens impregnated so *near* the hive, that the drones may be secured. Let a stock containing Italian drones be established a few rods from any other stock, and to prevent young queens from leaving their hives to meet the drones, let the entrance be adjusted so that only a worker can pass through. An hour or more before the drones begin to make their daily flight, by feeding this isolated stock with strained honey or sugar-syrup, both workers and *drones* will be excited to full flight. Now bring a queen a few days old before this hive, having one of her thighs fastened to a thread, so that when she is allowed to fly, she may be kept in full sight. The drones will probably be more apt to notice her, if they are kept hovering on the wing, near the hive, by closing the entrance, or covering the hive with a sheet. If the plan succeeds, as the impregnating drone may be secured, it can easily be ascertained to what race he belongs, and thus *nothing be left to conjecture.*

The Germans are of opinion, that there is "*a dash of black blood*" in the Italian bees, even in those districts where it is found in the greatest purity; and as beekeeping in the Italian Alps is in its rudest state, there is no reason why this mixture of black blood may not have existed for thousands of years. The Baron of Berlepsch says—"The Italian race, as we now have it, is not constant in color. * * * Nay, I might even venture to assert that the Italian bee is not yet a perfectly distinct and peculiar race, but requires to be made such by a course of careful breeding, by which the dash of common blood shall be excluded." Those who are acquainted with the methods by which the Durhams, Devons, and other breeds of cattle have been formed, will readily see that if we can *control* the breeding of bees, so as to breed from the best males and females, we can easily improve the Italian race. Mr. E. A. Brackett, the distinguished Boston sculptor, informs me that in the fourth generation he obtained, last year, by careful breeding, an Italian queen of a perfectly golden color. Even in our Northern States, we may raise six or more generations of queens in one season; and thus in a few years, if improvement is possible, we may reach the results of a long life time in the breeding of cattle.

While the German apiarians have proposed to breed queens from none but the most perfect and beautiful mothers, they have as yet devised no plan by which we can *make sure* that these queens shall be impregnated by the most perfect drones. As the drones of some Italian queens are much

more beautiful than those of others, we can select a stock containing such to impregnate our queens.

Even if the method which I have described should fail in practice, (and only an ignorant or reckless beekeeper would claim success for any such plan, before it has been fully tested,) it may still be possible to make great improvements. A number of the most beautiful drones might be caught, as they are leaving or entering their hives, and confined in a small hive containing one of the choicest unimpregnated queens. Then if this hive is carried some two miles from the apiary to a secluded place, and the drones excited by feeding, to make an early flight, good results may be obtained. Other processes will suggest themselves to the skillful, when once their minds are "put upon the track." And there is this to encourage us, that we may succeed in greatly improving the breed of Italian bees, by confining our attention to a few stocks, and may then in a short time supplant all our inferior queens, by those raised from the choicest parents.

In the apiary of Mr. Parsons, notwithstanding all the precautions employed by experienced beekeepers, a large percentage of young queens were lost* when they flew to meet the drones. This loss and the great delay which often occurs in the impregnation of queens, might be obviated by the process above described. As the crosses of Italian bees with black bees are found to be much superior to black bees, even those beekeepers who use the common hives will find it to their advantage to purchase an Italian queen. The great majority of those who use the improved hives, will probably find it best to aim, the first season, at supplanting all their common queens by Italian queens—without any special reference to whether they are impregnated by Italian or by common drones. The next season, as they will have none but Italian drones, they can from one purely impregnated queen obtain all the pure queens they need.

L. L. L.

Oxford, Ohio.

*Prof. KIRTLAND says:—The King-birds killed several of my young queens last autumn. These brilliant Italians are a conspicuous mark for such depredators.

BEE MOTH TRAP.

Take a wooden bucket or other large open vessel, and fill it about two-thirds with water. Then put in a quantity of old honey-combs, and set the vessel in the apiary, at night, near the hives. The bee moths or millers will be attracted by the strong odor arising from the vessel, and after hovering over it awhile, will drop into the water and be unable to extricate themselves.

Apistical Botany.

A complete catalogue of indigenous honey-yielding plants, with their botanical and common names, characters, habitats, etcetera, is felt to be a desideratum by every reflecting beekeeper. Most treatises on bees contain lists of plants producing honey; but even the best of these are exceedingly meagre, and furnish no adequate means of estimating the adaptedness of any district or country for extended bee culture. An attempt was made, a few years since, by Dr. Alefeld, to furnish the apiarians of Germany with the desired information, in a scientific form, by preparing a treatise on what may be called *Apistical Botany*. Though in some respects incomplete, that treatise is a decided advance on previous efforts in that direction, and therefore deserves notice and commendation. It would, however, be useless to reprint it here, as the Flora of this country differs widely from that of Germany, on which it is based. Yet, a general statement of the results, which his investigation enabled Dr. Alefeld to reach, may be interesting;—especially as we understand that the preparation of a similar treatise, adapted to the United States, is contemplated by a gentleman well qualified for the task.

Cryptogamous plants furnish neither pollen nor honey, and are therefore of no account in bee culture. The apiarian is interested only in phænagamous plants, and their distribution in his vicinity. It thus becomes desirable for him to know, at least approximately,

1. What is the number of phænagamous plants composing the entire flora of the country?
2. What proportion of these furnish pasturage for bees?
3. How many of them yield honey only?
4. How many yield pollen only?
5. How many yield both pollen and honey?

The entire flora of Germany and Switzerland, says Dr. Alefeld, comprises about 3500 species of indigenous plants; and of these, according to recorded observations, about 500 or one-seventh of the whole number are visited by bees. This, is exclusive of alpine and maritime plants, which have not been examined in this respect.

Assuming $1\frac{1}{2}$ leagues as the largest radius of the bee's flight, Dr. Alefeld found that, within such area around his residence at Darmstadt, in the Duchy of Hesse, there grow 700 species of indigenous phænagamous plants—being precisely one-fifth of the whole ascertained number growing in Germany and Switzerland.

On a further analysis of his list, prepared from

his own observations and those of other botanists, be found that, of the local flora—

50 species, or one-fourteenth, yield pollen only.

100 species, or one-seventh, yield both pollen and honey.

150 species, or more than one-fifth, yield honey only.

Hence 300 species, or three-sevenths of the local flora, furnish pasturage for bees, or constitute the *bee flora* of his district; and 400 species, or four-sevenths of the whole, furnish no supplies.

Of the 300 species constituting the local *bee flora*, Dr. Alefeld personally examined only about 200. The remainder are included in his list on the authority of other observers, chiefly of Gleditsch, whose statements are not always reliable.

The above classification shows that, in his district, bees forage about 250 species of plants yielding honey, and 150 species yielding pollen. He conjectures that from about 25 species *propolis* also is collected; and that there may be, in his vicinity, about 20 species more yielding honey and pollen, though not yet actually ascertained, but which will eventually be added to the list. The result of his investigation would thus be, that precisely one-half of the phænagamous plants of his district, constitute its *bee flora*.

Then, as the number of species of indigenous plants found in Germany and Switzerland, is five-fold greater than that of those found growing within the area of the flight of Dr. Alefeld's bees at Darmstadt, he infers that his vicinity furnishes a fair average of the distribution of such species in the country generally. Hence, he concludes it is highly probable, that if the proportional numbers ascertained for his district be multiplied by five, it would determine, with reasonable accuracy, the extent of the *bee flora* of Germany and Switzerland. As the conjectural addendum of twenty species would most probably be comprehended in the list of species yielding "pollen *and* honey" and "honey *only*," the relative numbers of the species of the flora of the entire country, would probably range as follows:

250 species, or one-fourteenth, yield pollen only.

600 species, or more than one-sixth, yield pollen and honey.

900 species, or more than one-fourth, yield honey only.

1750 species, or one-half of the entire flora of these countries, constitute their *bee flora*; and the remaining 1750 species furnish no pasturage for bees, and are of no account in bee culture.

Dr. Alefeld's treatise is a valuable contribution, but defective in several respects. He does not specify, except in a few instances, whether the particular species of which he is speaking, yields honey abundantly or not. Nor does he state the relative proportions in which the wild or uncultivated plants occur in his district, or in the general flora of Germany and Switzerland. Yet these are important items, and unless we possess a tolerably accurate knowledge of them, we cannot form a proper estimate of the value of the *bee flora* of any district or country. Some plants may yield honey very abundantly, but be so rare that the amount gathered from them is small. Again, they may be abundant and yield honey profusely, but may all bloom simultaneously and be of transient service; whilst there are no others succeeding them, to keep up a supply of pasturage. Or they may bloom very early in the season, when the generality of stocks are yet too weak to avail themselves properly of the abundance around them.

In preparing a *bee flora*, these points require attention. The time of flowering is, indeed, invariably noted in botanical works; but we are rarely informed whether the species found in any given locality, are abundant there or not; or what proportion they bear to other species there prevalent, or to the general flora of the country, or to the *bee flora* more especially.

These are the more important deficiencies of Dr. Alefeld's work. We have not adverted to them from any carping disposition, but with a view of inducing those, who may be willing to aid in collecting materials for a similar treatise embracing the bee flora of this country, to give a wider scope to their observations.

We stated before, that the preparation of such a work is contemplated by a gentleman well qualified to do it justice, if properly aided by observers in various parts of the country. We hope he will receive such assistance, and would invoke the interest and active co-operation of every lover of bees within our territorial limits. As in the case of meteorology and other branches of physical science, each observer at his special station should note and record, during the whole of the ensuing season, the facts that fall under his eye. These facts might then be forwarded to the publishers of Bee Journal, in the form of a report, to be collated and compared with the others. In this way, using the material already at hand, a very valuable work may be produced. Of course, due mention and credit will be given to any who generously lend their aid.

Let each observer keep a daily record, and note at the time the following points:

1. The date of observation.
2. The name of the plant, and whether common or rare in the district.
3. The number of bees working, whether few or many.
4. The material gathered, whether honey, pollen, or propolis.
5. The yield, whether scanty or abundant, and its duration.
6. Any other facts of special interest.

Every plant on which the bees work, whether it be well known or little known, whether cultivated or indigenous, should be chronicled. There should be no exception; although indigenous species require the more careful scrutiny, since we know less of their honey-bearing qualities, and the bee in the wild state finds in them its only source of supplies.

If the plant be unknown to the observer, or doubtful, let him dry a flowering branch with a few leaves, in a book or between sheets of paper, append a label with the date and a number in his journal, and forward it to us with that journal, at the close of the season.

The yield of honey in any case may be determined, by killing a bee and examining the honey-bag; the yield of pollen, by the accumulation on the legs. The color of the honey or pollen gathered from different plants, should also be noted.

Attention should likewise be directed to the various colonies of aphides or plant-lice; and the fact noted, if bees visit them to sip the nectarous exudation which they deposit on the leaves or branches.

The occurrence of honey-dew on the leaves of various trees and plants, and if preceded or attended by any striking meteorological phenomena, should be noted.

Inquiry might also be made as to *poisonous honey*, or rather if bees are ever seen on the blossoms of the *Kalmia*, Rhododendron, or Rhus vernix. A viscid substance has been observed on the blossoms of the Kalmia latifolia. Might not bees, under the pressure of necessity, collect it for propolis?

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AMERICAN BEE JOURNAL.

Philadelphia, April, 1861.

TO CORRESPONDENTS.

We have received several communications relative to the Dzierzon theory and the Baron of Berlepsch's exposition of it, which we prefer *holding over* for the present. When the Baron commenced his series of letters, he requested all those whose views or convictions differed from his own, to withhold comments till his self-imposed task was finished. He would then, he said, be ready to take up any topics which they might present for discussion, after having obtained a clear view of the entire field. We think it will be advantageous to adopt the same course now; particularly as it will involve only a brief delay, and may save some of our correspondents from being committed to views which they may subsequently desire to modify or withdraw. We design that all shall have a fair hearing; and shall regard all unrecalled communications, as presenting the unchanged sentiments of the writers.

There is an additional reason for this course. A full account of the Dzierzon theory is expected by our readers, and must be given. It will necessarily occupy a considerable portion of our columns for several months yet. To take up more of our space, simultaneously with the further discussion of the same topics, would prevent us from giving that variety which is likewise looked for in our pages, and which it is by no means easy to secure in a publication devoted, like the Bee Journal, to a speciality.

REMITTANCES.

Those who wish to remit money for subscriptions are respectfully requested to observe the following suggestions:—

Give the Name, Post Office, County and State in full. Write them so plainly that they can be read with ease.

In sending money we prefer gold. Gold dollars can be sent with safety, if fastened to the letter sheet by having a small piece of paper glued or pasted over them.

The notes of all solvent banks will be taken for subscriptions.

☞Thanks to our friends for the many large lists of beekeepers' names sent us, and we request them to continue sending.

Monthly Management.

APRIL.

This month furnishes the bees with increasing opportunities for gathering pollen; and in districts especially where willows, maples, and alders are plenty, they usually collect and garner large quantities of this article, so important for their own sustenance and the nourishment of their brood. Now, when the weather becomes settled and fair, and the workers are returning in crowds with pellets on their thighs, is the proper time for pruning the combs. Some beekeepers object to all pruning at this season, while others recommend a free use of the knife, but the judicious operator must be governed by the circumstances by which he is surrounded. The weather in this month is proverbially variable, and we not unfrequently find "winter lingering in the lap of May," and the safer course, therefore, will probably be to avoid extremes, by removing only such portions of the combs as have become mouldy or damaged, or are ill-placed, or are from any cause unserviceable. New and clean comb, containing worker cells exclusively, should be allowed to remain; and such box or basket hives as are low in shape, and thus have short combs, will consequently need little more dressing than a slight trimming of the edges and the removal of the droppings from the bottom board. Colonies whose bees are seemingly indolent, may be stimulated to action by more liberal pruning, and if no brood can be seen in the worker cells, and the cut edges of the combs are not speedily dressed, we may infer either that such colony is queenless, or that its queen is diseased or superannuated.

In healthy colonies there is now a regular and constant increase of brood, and consequently a daily increasing consumption of honey. Should a late spring follow a rather open winter, the supply of stores may become so reduced, if not entirely exhausted, as to interfere materially with the rearing of the young, or endanger the existence of the entire stock. Feeding during wet or cold weather, should therefore be resorted to, not to induce more ample egg-laying, but to save the existing brood from destruction, for the bees will occasionally sacrifice it when suffering from or threatened by famine. Sometimes, too, such destruction of the brood is caused by the want of water, which is indispensably necessary for the preparation of the jelly on which the larvæ feed; and this should therefore be furnished to them when the weather does not permit them to go in search of it. In movable comb hives, honey and water can readily be supplied, by pouring them into empty combs and inserting these near the brooding cluster. The wants of bees in common box or basket hives may be provided for, by shortening the combs something, placing an empty comb flat on the bottom board, after pouring some honey and a few spoonsful of water in the cells, or laying some candy on the cells containing the water. Care should be taken not to give them more honey in a comb so placed, than they can carry up during the night, especially if the colony is weak, so as not to attract robbers.

Almost every apiary contains some weak colonies in the spring. Where movable comb hives are used, such colonies can be strengthened, by transferring to them from their stronger neighbors, combs containing brood nearly mature. But when they can be procured, it is better to introduce into them a reinforcement of workers from a distant apiary. If these be first well fed with slightly diluted honey, and introduced about dusk in the evening, they will be readily received. Such processes, however, are utterly futile, unless the colony intended to be strengthened has a healthy and fertile queen; and that fact should be ascertained before any further steps are taken. A queenless colony had better be broken up at once, and the bees given to one that has survived the winter in a more favorable condition.

When the bees begin to build new combs, as they usually do about the time when the fruit trees are in blossom, care must be taken to prevent them from building drone-combs in the brooding apartment—unless, for some special purpose, the production of drones be desirable. In movable comb hives, this can be done by removing the frames in which drone-combs have been started, and inserting instead, frames furnished with strips of worker comb. Weak colonies having a fertile queen rarely start drone-combs; and strong colonies manifesting a decided disposition to construct drone-cells, may be brought to a different temper, by repeated removals of bees and brood. It is more difficult to control or counteract the propensities of bees in this particular, if they are kept in common hives; but it may be effected, to some extent, by drumming out and transferring a considerable portion of the workers, and cutting out the drone-combs which have already been built.

The beekeeper's efforts should constantly be directed to the suppression of drone-brood, for, notwithstanding his utmost vigilance, there will be always many more drones produced in his apiary than are needed—unless queen-raising be a principal part of his business. Where honey is the object, he should sedulously foster the rearing of workers, so that, at the favorable moment, when pasturage is abundant, he may have at command a numerous body of energetic laborers, instead of having his hives crowded with a horde of worse than useless consumers.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. V.

The next proposition to be examined, is—

6. In the act of copulation the genitalia of the drone enter the vulva of the queen, are there retained, and the drone simultaneously perishes.

This was in substance the view held by Huber, and rejected as ridiculous or absurd by Spitzner and others, then and since. It is unnecessary now to recapitulate Huber's experiments and reasoning, because we have, in addition, recent and positive evidence that his surmise was well grounded. Queens have, in numerous instances, been seen returning from their hymeneal excursions, with the evidence of copulation protruding from the vulva, as a white threadlike substance. This has commonly been regarded as the penis of the drone, but is, in reality, only a fragmentary portion of the seminal duct adhering to the severed genitalia. Conjecturing this, I resolved to have the facts ascertained by procuring the dissection of a queen caught on her return. On the 23d of July, 1853, I had an opportunity to secure one whose vulva was distended by a white mass seemingly firmly wedged in, showing that a severance of the entire sexual apparatus of the drone had taken place. I immediately immersed her in diluted alcohol, and sent her to Prof. Von Siebold, who has published the following account of the result of his investigation.

"I was struck, at the first glance, by the fact that the orifice of the vulva of this queen was widely distended, having a clearly defined substance protruding—two yellowish horns, curved upward, being particularly prominent. I soon satisfied myself that this substance was not an extruded portion of the intestines, for, by careful manipulation with a pincette, I succeeded in extracting it from the vulva. On examining it with a microscope, I found I had before me the severed sexual apparatus of a male bee. The two yellowish horns were simply those two curved and pointed *cul-de-sacs*, which a slight pressure on the abdomen of a drone causes to spring forth, resulting in his death. Between these horns was a dark brown body projecting into the vulva, which I recognized as the penis of the drone. It was hence evident that I had before me a queen bee, in whose vulva the detached sexual organs of the male bee remained inherent, after copulation."

It would be superfluous to add anything to this decisive evidence, in support of the first portion of the proposition; nor need I undertake the formal demonstration of the second. That the act of copulation involves the death of the drone, is well known to all experienced beekeepers. The extrusion of the genitalia of a drone, by however slight and gentle pressure effected, invariably results in his immediate death. This may be surprising to all, and incredible to many; but the ascertained fact is all that now concerns us. It is not incumbent on the observer to assign any reasons for it.

While on this topic, I may state that I conceive that, for effecting copulation, the queen must possess the free and full use of her hinder legs—though the special necessity of this is not apparent, except from circumstances. Dzierzon states that a virgin queen, crippled from her birth in one of her hinder legs, remained sterile after making numerous excursions while drones abounded. I had the curiosity to verify the fact, by mutilating the hinder legs of a young queen before fecundation, and though I saw her fly out frequently afterwards, she never became fertile.

It has also been supposed that the queen employs her hinder legs, in ridding herself of the dead drone, after copulation. But if this be so, it is still manifest from Dzierzon's observation and my experiment, that this is not the sole nor the primary use she makes of them on the occasion.

I will now take up the next proposition:

7. The fecundation of the queen, once accomplished, is efficacious during her life, or so long as she remains healthy and vigorous; and when once become fertile, she never afterwards leaves her hive, except when accompanying a swarm.

Since it has been shown that the fecundation of the queen is always effected outside of the hive, and fertile queens with defective wings are known to live several years, (I had one that survived five years after losing her wings,) though the colony continues in a prosperous condition all the time, it is evident that, ordinarily at least, fecundated queens do not again leave their hives except to accompany a swarm. But may not occasional exceptions occur? Were all those mistaken or deceived, who declare that they saw *fertile* queens issue in the spring and at other seasons, though no swarm left? They certainly were mistaken; and I beg those who may hereafter see a supposed fertile queen issue under such circumstances, to make an immediate examination of the colony. I can assure them they will in no instance find either eggs or brood in the cells; or if brood be found, it will be such only as is sealed and nearly mature.

But the question assumes a different aspect when we inquire, whether fecundated queens, *which have not yet begun to lay eggs*, do not occasionally repeat their excursions? To such an inquiry, I must explicitly reply in the affirmative? Two cases came under my own observation (one in 1843, and the other in 1849,) where young queens which I had seen returning with the marks of copulation, did subsequently issue again—the one on the same day, the other on the day after. I also saw each of these return from her second excursion; but neither of them displayed evidence of renewed fecundation. Dzierzon also observed a queen issuing a second time, under similar circumstances. We may therefore dismiss this, and proceed to the next proposition.

8. The ovaries of the queen are not impregnated in copulation; but a small vesicle or sac which is situated near the termination of the oviduct, and communicating therewith, becomes charged with the semen of the drone.

"What a preposterous and ridiculous hypothesis!" So exclaim, not I, but others; though I candidly confess that, when I first heard this doctrine announced, I was exceedingly incredulous. It was only after long hesitation and study, yielding gradually and very slowly to the evidence of undeniable facts, that I became a convert. Even then I assented to it as an hypothesis *to be accepted only for the time;* first, because neither others nor I could offer anything better; secondly, because by it all the mysteries otherwise inexplicable, were solved; and thirdly, because many isolated facts corroborated it.

I reasoned thus: Since uniform experience shows that young queens with defective wings never become qualified to lay *worker* eggs, and that healthy young queens, able to fly, become so qualified only when drones exist, it is clear that fertilization qualifying them to lay such eggs, is effected exclusively outside of the hive. Now, as we further know from experience that queens sometimes emerge from the royal cells with crippled wings, and do yet in exceptional instances lay eggs from which drones are developed, we have only this alternative—either to conclude that such queens lay drone-eggs without having been fecundated; or that fecundation, if occurring within the hive, is inefficient. We might be induced to adopt the latter view, were it not also an observed and recorded fact that a young queen with crippled wings, reared in an artificial colony, laid drone-eggs, though the hive contained no drones. This being the case, we cannot avoid conceding that, to enable a queen to lay drone-eggs, fecundation is altogether unnecessary. Does not this likewise fairly lead to the further inference, that all drone-eggs are unimpregnated? Again, since it is an admitted fact that the seminal sac or spermatheca of every worker-egg-laying queen contains a milk-white viscid liquid, whilst the spermatheca of every sterile or only drone-egg-laying queen is either entirely wanting, or contains a limpid, watery fluid, is it not reasonable to infer a connection between the production of worker-eggs and the milk-white liquid in the spermatheca, and that the worker-eggs thence derive their impregnating matter?—in other words, that the spermatheca contains the male semen. But if the ovaries be not impregnated in copulation, and all the eggs germinated and developed therein be male, I cannot conceive how the laying of female eggs, which takes place only when the spermatheca contains the milk-white liquid, can be explained otherwise, than by assuming that the male eggs are converted into female, by being brought into contact with semen from the spermatheca; and that

the eggs remain male when not exposed to such contact—an operation which the queen can effect or omit at her option. And that she possesses such optional power, is evident from the fact that she frequently passes from worker to drone-cells when ovipositing, and lays, as it were in one breath, eggs from which proceed workers and eggs from which proceed drones.

I repeat, I reasoned thus, as it is my habit never to inquire about the *possibility* of what I know exists, but to content myself with believing that what actually exists, *is possible.*

A few remarks more. On examination, I found the difference between the spermatheca of a fecundated and an unfecundated queen, to be invariably constant and uniform. Of sixteen fecundated queens which I dissected in the fall of 1851 and 1852, each had the spermatheca filled with a milk-white, viscid liquid; and of twenty-seven unfecundated queens dissected in those years, I found the spermatheca was either wanting or filled more or less with a limpid, watery fluid. Now, this constant and uniform difference being a fact, the only question remaining is whether the milk-white liquid is in reality the semen of the drone or male. This, too, has been settled by the microscopic examinations made by Prof. Leuckart and Prof. Von Siebold. Each of them found spermatozoids identically similar in the contents of the spermathecæ of fecundated queens, and in those of the testes of drones. The latter, moreover, found spermatozoids identically similar in worker-eggs, but never found any in drone-eggs. See his treatise "*On Parthenogenesis in Bees, &c.*" The demonstration is perfect and conclusive.

Gundelach and others imagined that the viscid liquid contained in the spermatheca, was intended simply to serve as gluten to enable the queen, when ovipositing, to attach the eggs in their proper position to the bottom of the cells. This, indeed, *might* be so, but is not so in reality. This is clearly shown, by the fact that the drone-egg-laying queen sent by me to Dr. Barth for dissection, in 1852, attached all the eggs she laid, quite methodically to the bottom of the cells, though on dissection it was found that *she had no spermatheca!*

(For the "Bee Journal.")

Can swarms be divided in the common box hive, and if so, how? Or how can you prevent natural swarming in the common hive? Any information would much oblige J. B. D.

Marion, Forest Co., Pa.

☞Please send us the names of beekeepers.

[For the "Bee Journal."]

I wish to submit the following for you or others to solve:

If it requires the drone-sperm (which is animal secretion), to be deposited with the queen to enable her to impregnate the drone-eggs, in order to produce workers, which is a distinct bee in its physiology and in its propensities, from that of other bees; and it requires the royal jelly (which is nine-tenths animal secretion), to impregnate the worker-larva so that it would become a queen, which is a distinct bee in her physiology and in her propensities; the worker and queen are both impregnated by animal secretion. I wish to know from what bee the secretion possessed of such impregnating power is obtained, which is found with the royal larva. Is there any difference between that found in the queen's spermatheca and that found with the royal larva, when separated from other substances? The solving of the above, will be of the utmost importance in settling that vexed question relative to the natural habits and reproduction of this bee, and the phenomena of hybrids between the common and the Italian bee. It is a subject which is at the foundation of the true history of that truly wonderful insect, the honey bee.

Henrietta, N. Y. E. KIRBY.

☞The error of our correspondent consists in supposing or assuming that drone-sperm and royal jelly are both animal secretions and substantially identical; whereas, the former alone is an animal secretion, and the latter a chylified substance. The first contains innumerable spermatozoa, living and active; and proved by Prof. Von Siebold to be identical in the testes of the drone, the spermatheca of the queen, and the yolk of the worker-egg—but never found in the drone-egg. It serves only for procreative ends, and from its nature can serve no other purpose. The second is a product of partial digestion in the chyle stomach of the worker; and consists, according to the analyses of Drs. Wetherill and Dönhoff, of highly concentrated nitrogenous substances;—serving the purpose of nutrition, and not adapted for any other purpose.

The microscopic examinations and chemical analyses of Prof. Von Siebold, and Drs. Wetherill and Dönhoff, are regarded as accurate and conclusive. If our correspondent is in possession of scientific investigations exhibiting different results, we shall be pleased if he will communicate them to us for publication.

☞*Please send us the names of beekeepers.*

[For the "Bee Journal."]

To Introduce an Italian Queen

IN A COLONY OF COMMON BEES.

Many Italian queens have been lost, both in this country and in Europe, in the attempt to introduce them among colonies of common bees. The following facts confirm the statement that common bees do not as readily receive such queens, as one of their own kind.

In September last, I deprived a stock of common bees of their queen, and a few days after, cut out all the rudimental queen-cells. After the lapse of a few days, a second instalment of royal cells was destroyed, and a common queen (not their own) being offered to the bees, she was well received. The manner of her reception being ascertained, she was in a few moments removed, and an Italian queen (both queens were impregnated) was given in her stead. She was stung to death before she could be rescued from the enraged bees. The common queen being immediately returned, was again received with great favor.

As many persons will endeavor, the coming season, to give Italian queens to common colonies, I shall give the method used by Messrs. Brackett and Carey, who introduced hundreds last year, with almost uniform success.

A *queen-cage* is used, made as follows: Take a piece of wire-cloth, three inches square, and roll it into a tube, with a lap of three-eighths of an inch. Fasten it to a piece of soft wood, by driving a tack at each end through the lap. Take away the queen from the colony to which the Italian queen is to be given, and in from four to ten hours, or as soon as the bees manifest undoubted consciousness of their loss, put the Italian queen into the cage, with about a dozen workers of her own colony. Before confining her, put into one end of the cage a piece of sponge, about the size of a robin's egg, filled with honey—which is better than sugar syrup, as it does not dry up so soon. After closing both ends with a cork, put the cage on the frames, directly over the cluster, the honey-board being taken off. Let it remain in this condition for about thirty-six hours, and then remove one of the corks—disturbing the bees as little as possible. When a hive without frames is used, the queen-cage should be placed between the combs. If the weather be cool, the hive should be kept in a place moderately warm, so that the queen may not become chilled, even if the bees should not cluster upon the cage.

As circumstances may occur to render a more speedy introduction desirable, I give substantially the method by which I seldom failed to introduce the Italian queen, in less than an hour after the removal of the common one. Drive the bees from their combs; after removing the queen, shut them in a box well ventilated, and place them a few rods from their old stand. Give them honey in a feeder, so that all may be completely gorged; and in about fifteen minutes after they miss their queen, offer them the Italian queen. As soon as they receive her, restore them again to their combs, and put them on their old stand. In hiving new swarms, I have been able to introduce the Italian queen, immediately after the bees became aware that their own queen was gone. Unless queens are plenty, I advise adhering to the plan first described.

Oxford, Ohio. L. L. L.

(For the "Bee Journal.")

I would inquire through the Bee Journal, the right distance apart for frames? Some say 1¼ inches, and others 1½ inches apart.

Last season I gave queen-cells to artificial swarms, made by division, and found that the bees generally destroyed them and raised queens from the egg. I think the reason was giving them the cell, when I divided them, and before they had discovered the loss of the old queen. I would like to know whether any one else has noticed the same?

Canfield, Ohio. J. W.

☞To ascertain whether larvæ could be reared in royal cells by means of artificial heat, I cut out of one of my hives four royal cells containing jelly. From one of these I removed the larva, and substituted for it a worker larva one day old, and placed it in an incubating stove kept at a temperature ranging from 88° to 104°. When the larva had consumed the jelly, I gave it a further supply taken from one of the reserved cells, diluting it slightly with water. It was interesting to observe the greediness with which the larva devoured the pollen, after fasting several hours. It grew so rapidly, that the increase of size from day to day was plainly perceptible. I gave it fresh supplies of food every morning; and when, after five or six days, it appeared to have attained full growth, I capped the cell; and on the fifth after capping, I found a fine royal nymph therein.

I made similar experiments to rear worker-larvæ two and three days old, by feeding them with a mixture of pollen and honey, but failed in every instance. They survived only two or three days, under such treatment. DÖNHOFF.

☞*Please send us the names of beekeepers.*

Poison of the Bee.

BY THE REV. GEORGE KLEINE.

Dr. Dönhoff, in one of his recent "Contributions to Bee Culture," gives us an interesting article on the poison of the honey bee. In the course of it, he refers to the question whether the human body can become so accustomed to the virus, that the influence of a sting shall no longer produce swelling or other unpleasant effects. On the ground of theory and experience he appears to maintain the negative, though the negation is not expressed in so many words. As I have repeatedly alleged that this result does take place, the respected author of the article referred to, will excuse me for endeavoring to sustain the opinion I entertain.

Dr. Dönhoff himself ascribes the effect of the poison, to an irritation of the nervous system and of the organism in general, whence pain, inflammation and swelling supervene. Although I entirely concur with him in this view, I nevertheless do not concede that the theory militates against the assumption, that the nervous system and the organism in general, may gradually become habituated to the irritation to which they are frequently exposed, and may consequently become less sensitive thereto. I cannot, of course, undertake to maintain a scientific controversy on a topic foreign to the sphere of my usual studies. I can merely rely on the proverbial truths that "habit is very powerful," that "habit is a second nature;" and refer to the case of the segar-smokers, the opium-eaters, the coffee-drinkers, and the grog-bruisers. I infer that in each and all of these, the irritability of the nervous system must gradually have become less sensitive or acute. It is also a well known fact that persons perpetually exposed to them do, from habit, gradually become indifferent to the most offensive odors, so as to be no longer disagreeably affected by them; and that the tongue and palate may be educated to disregard the most pungent spices. I know likewise, from personal observation at the hotel in Düsseldorf, that a pinch of snuff caused a violent fit of sternutation in Dr. Dönhoff, while another, taken from the same box, at the time failed to excite a single sneeze in Dr. Schmidt. Theorizing on these facts, I conclude that the nervous system must be able to become habituated to the action of *nicotine*, alleged to be virulent poison. Still, as before remarked, I do not undertake to controvert the reasonings of scientific men. I cleave to actual practical experience, and thus feel myself strong in the matter under consideration.

If ever one suffered from the unpleasant effects of bee poison, I am the man. A sting on my hand would cause such a swelling of the arm and shoulder, that my coat sleeve, none of the narrowest either, had to be turned inside out in drawing it off. And a sting in the face produced so huge an intumescence, that I could literally see daylight only by lifting with my fingers the tumefied pendulosities hanging from my brow. I was so repeatedly placed in unpleasant predicaments by such occurrences, that I was often on the point of abandoning bee culture altogether. But my attachment to the bees regularly triumphed, and my perseverance finally enabled me to secure exemption from suffering. Swelling no longer supervenes when I am stung; except slightly, if the wound happens to be on one of my eyelids.

I am now indeed classed among quinquagenarians, and it might be supposed that my skin has become tough and callous. I will therefore cite more youthful testimony, in the case of my nephew, whom I educated in bee culture and who has a thorough love for the pursuit. He too, at first, became much swollen when stung, and if the infliction happened to be in his face, would be so disfigured thereby that his intimate acquaintances no longer knew him. He has now so completely overcome this, that he scarcely thinks it worth while to extract the sting when he happens to be stung. He is only fifteen years old, and his skin retains all its youthful softness and sensibility.

I could add other similar examples which have come under my own observation; but will refer only to the case of William Günther, the well known beekeeper of the Baron of Berlepsch, and who is a practical apiarian *sans compare*. He informed me that originally he had a decided antipathy to bees, and avoided them whenever he could, because their stings affected him grievously—often causing temporary blindness. But all this passed off, when his system became accustomed to the virus. Günther is still in the prime of life—in the full vigor of youth and health; and in his case, therefore, the immunity can only be accounted for, on the ground that his organism has become habituated to the poison.

But still this habituation requires time, and may be aided or retarded by the peculiar constitution of the individual. I noticed exemption in myself only after the third year; whereas a single season sufficed to render my nephew sting-proof. I do not doubt that in time Dr. Dönhoff also will so accustom his system to the poison, that he shall no longer be able to use his own person as a test of its effects on the human organism.

☞Please send us names of beekeepers.

[For the Bee Journal.]

Persons of a sanguine temperament are apt to fancy that bee culture is so simple a matter, that whoever engages in it cannot fail to be successful. It may be well to make a few suggestions for the benefit of such.

Anybody may certainly keep bees, but not every one is qualified to become a true bee culturist. Certain peculiar talents, tastes and traits, physical, mental and moral, are required; and without a due proportion and combination of these, success is not probable, if possible.

Among the physical requisites are strong arms, a steady hand, a keen eye, and a sweet breath. The mental or intellectual endowments are not less important. He should possess a good memory, a sound judgment, habits of close observation and accurate discrimination, with some ability to divine results from casual incidents or remote causes. He must be in no wise superstitious, but should ever strive to have a good reason for what he does or designs to do. So finally, certain moral qualities are equally indispensable. Yet if, at the start, he possess these only potentially, they may soon become adequately developed and fixed by practice. He must be cool, self-possessed and patient; not hasty and ill-tempered. He must be fearless and resolute; economical, yet not miserly; at times liberal, but never lavish; forbearing and sympathizing, but not weakly compliant and yielding. He must be prompt and energetic, yet careful and cautious—never negligent or procrastinating. He must be neat, tidy, and cleanly in his person, arrangements and processes; and a decided and uncompromising foe everywhere to slovenliness and sloth. The miserly would let his bees starve when a few pounds of honey would save them, because he cannot resolve to make the needed though only apparent sacrifice. The weak-minded and irresolute would not dispose of his feeble stocks at the proper time, but nurse them along in their helplessness—thus providing for himself an annoyance and a plague. The timid would fear to operate among his bees as he should, and be likely to devolve important manipulations on some bungler, or inexperienced neighbor. The negligent would not arrange his apiary or cleanse his hives seasonably. Nor would he use the needed precautions when feeding weak stocks, or depriving others of surplus stores; thereby attracting robbers and exposing his apiary to destruction. And the slovenly will permit spiders, ants and vermin to infest his bee house, and moths and worms to invade and harbor in his hives.

It is hence obvious, why he who engages in bee culture should possess the enumerated qualities. It is not, indeed, indispensable that all of them should be fully developed at first. If he only have a natural aptitude for them, they will be stimulated by practice, and finally also influence his deportment in other pursuits. We shall rarely find a thorough beemaster who is an improvident housekeeper, a careless parent, a spendthrift, or a bad citizen; or who is impatient, irascible or domineering. He will generally exemplify by his conduct the truth of the adage, that he who is competent and faithful in minor matters, will be found so likewise in more important concerns.

Strange Sight—Seventy Swarms of Bees at War.

Ezra Dibble, a well known citizen of this town, and for many years engaged extensively in the management of bees, communicates to us the following interesting particulars of a battle among his bees: He has seventy swarms of bees, about equally divided on the east and west sides of his house. On Sunday, Aug. 14, about 3 o'clock, the weather being warm, and the windows open, his house was suddenly filled with bees, which forced the family to flee at once to the neighbors. Mr D., after getting well protected against his assailants, proceeded to take a survey, and if possible, learn the cause which had disturbed them.

The seventy swarms appeared to be out, and those on one side of the house were arrayed in battle against those on the other side; and such a battle was perhaps never before witnessed. They filled the air, covering a space of more than one acre of ground, and fought desperately for some three hours—not for "spoils," but for conquest; and while at war, no living thing could exist in the vicinity. They stung a large flock of Shanghai chickens, nearly all of which died, and persons passing along the roadside were obliged to make haste to avoid their sting.

A little after 6 o'clock, quiet was restored, and the living bees returned to their hives, leaving the slain almost literally covering the ground, since which, but few have appeared around the hives, and those apparently stationed as sentinels to watch the enemy. But two young swarms were entirely destroyed, and aside from the terrible slaughter of bees no other injury was done. Neither party was victorious, and they only ceased on the approach of night, and from utter prostration. The occasion of this strange warring among the bees is not easily accounted for; and those most conversant with their management never before witnessed or heard of such a spectacle as here narrated.—*Conneaut (Ohio) Reporter.*

☞The above account of a most singular freak of bees was published about seven years ago, but is of sufficient interest to merit preservation.

(From the "Bienenzeitung.")

The Italian Bee.

BY DZIERZON.

For me, the Italian Bee possesses not only an equal, but a much greater importance and value for *practical* purposes, than for mere demonstration of *theory*. My own convictions as to the entire correctness of the theoretical principles on which my system of bee culture is based, were perfectly clear and fixed, long before I saw an Italian bee. The introduction of this species possessed interest for me, in a theoretic point of view, only as furnishing the means of readily and palpably confuting the objections so pertinaciously urged by my opponents. They could thus be confronted with ocular demonstration of that which, till then, they neither could nor would see; and the truths which they were ever and anon questioning and denying, could thus be made manifest to them and to every inquirer. In this aspect, however, the importance of the Italian bee was necessarily transient, continuing only till the triumph of truth was conclusively secured. Nevertheless, the Italian bee will continue to be of importance in some other theoretical relations. Various observations—for instance, how long workers live under peculiar circumstances, or in particular localities and seasons—will be greatly facilitated by means of this distinctly marked insect; and that most difficult task, the detection of a fertile worker in a drone-breeding, queenless colony, may be accomplished with comparative ease, by employing this species. But, for practical bee culture, the importance of the Italian bee is vastly greater, because it is direct and permanent.

Distinguished as the Italian bees are from the common kind by their color and markings, they are equally distinguished from them, in other respects, by peculiar traits and properties, always decidedly advantageous to their owner. My experience and observations in this regard, are fully corroborated by those of Capt. Baldenstein, Mr. Rothe, Dr. Dönhoff, Rev. Mr. Kleine and others.

Their importance for practical bee culture, I conceive, results from the following five peculiarities:

1. *Their marked difference in color.* I find this important in practice, not simply because they are prettier—though external appearances are not matters of indifference with persons of taste; but because, at least when first introduced in a neighborhood, they can readily be distinguished from those usually cultivated there, and hence serve for some time to prevent vexatious controversies respecting the ownership of fugitive swarms. Thus I was able with a clear conscience to designate and reclaim as mine, a swarm which had decamped from one of my apiaries, and which those who found it were about hiving, when I arrived in pursuit. In such cases, it is not even requisite that the fugitive swarm should be composed wholly of bees of the pure race. If, by the insertion of a single brood comb, a few hundred Italian workers have been introduced among common stock, the issuing swarm will be sufficiently mixed and marked to be easily recognised.

2. But of still greater importance is *their superior industry*, their indefatigable eagerness to gather honey and increase the stores of their hives. At the close of the season especially, when forage begins to fail, they will visit flowers disregarded by others; will resort for supplies to the saccharine juices of damaged fruit; and will even attack the hives of common bees. This latter propensity may indeed, at times, become a source of annoyance. But gathering honey and robbing stores are, in a great degree, inseparable instincts in bees; and he who is delighted by the former trait, displayed while the season is propitious, must not complain that the latter exhibits itself in times of comparative scarcity. He can require from his bees, as irrational creatures, no higher standard of morals, than to appropriate honey wherever it is accessible. But this greater propensity to rob, does not involve any danger to the Italian stocks themselves, because—

3. The Italian bees are *the most fearless and intrepid defenders of their own stores.* They are much more vigilant than common bees, and not so easily circumvented. Every stranger that seeks entrance into their hives—whether of Italian or common origin—is at once arrested, and repelled or slain; and I doubt whether an Italian colony possessing a healthy queen, could be conquered by any assailants. The frequent examinations to which I had occasion to subject my artificial Italian colonies, to ascertain whether they would receive an offered queen, or whether a young queen had been hatched, or had been fecundated, or was producing genuine brood—and which had to be made when robbing-bees were numerous—often exposed those comparatively feeble colonies to violent and even furious assaults. They were usually surrounded, in a few minutes, by crowds of assailants, among which, the Italian bees (whose sense of smell appears to be exceedingly acute) were always prominent. But on closing the hive, peace and quiet were immediately restored, because not a bee could force an entrance or succeed in abstracting the coveted treasure. A few bees suffice to

guard the entrance, and weak colonies can easily repel an attack. For successful defence, vigilance, courage and agility are the indispensable requisites—qualities in which common bees are greatly deficient, but which the Italians possess in the highest perfection. If, in autumn, we find the most ample stores in our Italian hives, and obtain from them not only the earliest swarms in the spring, but some surplus honey likewise, in years when common bees can spare none, these results are attributable in part to the good qualities already referred to, possessed by the Italians, but more especially to the significant fact that this species of bees

4. *Kill their drones earlier in the season* than common bees do—usually soon after the young queens have been fecundated and commence laying. Hence their drones sometimes disappear ere we are aware of their expulsion, even early in June. Whereas common colonies are then still producing them in abundance, and frequently retain them till September and October—thereby causing the useless consumption of many pounds of honey. Though an early expulsion of drones may not be desirable when we are anxious to rear an additional supply of young queens of the pure race, yet this peculiar propensity is of the utmost practical importance, since a large amount of honey is thereby saved, and bee culture consequently rendered more remunerating. Besides, when the preservation of drones to a later period is desired, it can be accomplished by removing the queen from some populous colony, and the bees in accordance with their native instincts, will retain their drones while engaged in rearing a successor.

5. But the most agreeable trait which pure Italian bees exhibit, is *their tractableness and docility.* They very rarely sting, and usually only when they have been accidentally annoyed or designedly irritated. Common bees not unfrequently become exceedingly troublesome and sometimes dangerous; but nothing of the kind need be apprehended from the Italians. Even when mingled together in the same hive, the common bees retain and manifest their irritability, and the Italians their placableness—showing that these traits in each are peculiar and natural. So long as the race is kept pure, this is its distinguishing and most gratifying characteristic; and we are thus assured of the permanent significance of the Italian bee in practical bee culture.

☞We are printing heavy editions of the Bee Journal, and will be pleased to forward specimen copies to all who wish them. Our friends will oblige us by sending names of beekeepers.

Delayed Fecundation.

In his "*New Observations on Bees,*" Huber assigns twenty-one days as the longest term during which a queen-bee is susceptible of fecundation, so as to become *fully* fertile—that is, capable of laying *both* worker and drone-eggs. His opinion was based on the results of five carefully conducted experiments, in which queens aged from twenty-two to thirty-six days, were observed to make excursions and return bearing evidence of copulation, but each of which, to his amazement, subsequently laid drone-eggs only. These results were so generally regarded as settling the question, that the term of twenty-one days, as "the outside limit," is accepted by apiarians and has almost become a stereotyped phrase in treatises on bee culture.

Recent observations, however, have shown that the term is not thus limited, and bring the whole subject up for re-investigation. The Baron of Berlepsch states that he has had several queens which were fecundated after they were thirty days old, and still proved to be *fully* fertile; and that on the 23d of July, 1856, he saw an Italian queen, which emerged from the royal cell on the 20th of June, return to her hive with marks of fecundation. A few days later she laid eggs in worker-cells, from which workers and not drones were afterwards developed. In this instance the queen was thirty-three days old; and there seems to be no reason to doubt the correctness of the statement.

Dzierzon also mentions four queens, hatched about the 20th of August, 1856, which he observed returning from excursions on the 25th and 26th of September, with evidences of copulation. But, as he does not say that these afterwards laid worker-eggs, it is uncertain whether they became fully fertile or not, and no inference either way can be drawn from the observation.

But in a late communication to the Bienenzeitung, Mr. Hemman, of Weissenfels, relates the case of an Italian queen, hatched on the 31st of July, 1860, which returned with marks of copulation on the 21st of August, but remained sterile. On the 15th of September, she was again seen returning with evidence of fecundation. She subsequently laid worker-eggs, and on the 25th of September, the combs contained capped worker-brood. Here was an interval of forty-six days, though the queen still became fully fertile. On the 28th of September, Mr. Hemman also saw another queen, hatched on the 31st of July, returning from an excursion after an absence of fifty-eight minutes—being then fifty-nine days old. Whether this queen afterwards became fertile, was not ascertained when the communication was written.

These statements warrant the inference that Huber's opinion was based on insufficient data, and that the question remains unsettled. But the introduction of movable comb-hives has so increased the facilities for observation and so multiplied the number of observers, that the full extent of the limit cannot long remain undetermined.

[For the "Bee Journal."]

Modification of Kritz's Method.

Might not Kritz's method, as described in the April number of the Bee Journal, be improved as follows?

After drumming out as many bees as you can from A, set the forced swarm on the stand of A, and remove B to a new place, putting A on its stand. You thus secure enough bees for A, to take care of all the eggs and brood, and to work vigorously in rearing queens—while the course of Kritz may sometimes occasion a severe loss of brood or eggs.

As soon as A swarms, put the swarm where A has now been standing, removing C to a new place and putting A on C's stand. When A swarms again, put the swarm on A's stand, removing D to a new place and putting A on D's stand. When A throws out its third swarm, put the swarm on a new stand.

The arrangement will be as follows:

Originally:

After drumming out a swarm from A:

After A yields the first voluntary swarm:

After A yields the second voluntary swarm:

After A yields the third voluntary swarm:

It might be advisable, after A has thrown its third swarm, to put the swarm in the place of B, removing B to a new stand; and a few days later, when there is no danger that A will swarm again, it might be put on the stand of B, and B removed to a new place.

It will be well for those whose experience with movable comb hives is small, or who for any reason prefer natural to artificial swarming, to test this plan with their movable comb hives.

Oxford, Ohio. L. L. Langstroth.

☞I have noticed that some colonies carry in much more pollen than others, even when there is no perceptible difference between them as to strength or age. Honey from colonies that gathered much pollen, I have also found difficult to drain from the combs. It is of greater consistency, and more viscid or *tough*. As regards sweetness and flavor, I could perceive no difference.

A. Braun.

EFFECTS OF COLD ON SPERMATOZOA.

Dzierzon and Berlepsch have remarked that a queen bee exposed for some time to a temperature below the freezing point, becomes incompetent to lay worker-eggs. Berlepsch attributes the result to the freezing of the spermatozoa. Last winter, I exposed a normally fertile queen to a degree of cold ranging from 25° to 30° Fahr.; and then returned her to her hive, after she had revived. She laid no worker-eggs subsequently. Three weeks later, I killed and dissected her. Under a microscope of 400 linear magnifying power, the contents of the spermatheca presented the appearance of a homogenous fluid, totally devoid of spermatozoa. It seems, hence, that the spermatozoa not only lose the power of motion, but are really decomposed by the action or effects of frost.

Dönhoff.

☞Our friends will please accept our thanks for their exertions in behalf of the Bee Journal.

[For the Bee Journal.]

Hermaphrodite Bees.

In the "Entomologist's Annual" for 1859, there is depicted and described a hermaphrodite bee, of which one side bears all the characteristic features of the male, and the other those of the female.

Accounts of similar androginous bees are contained in the Bienenzeitung for August 1, and October 10, 1860—the specimens having, in each instance, been sent to Dr. Dönhoff for examination and description. The first specimen resembled a worker in the anterior portion of the body, and a drone in the posterior. The second specimen resembled a drone on the upper or dorsal side, and a worker on the lower or ventral side. Dr. Dönhoff describes each very minutely; and when treating of the first, submits the following suggestions as to the manner in which that remarkable insect originated: *

1. "It is possible that the egg from which this bee proceeded, contained two yolks; and that the one was impregnated, while the other remained unimpregnated. In the one yolk a drone began to be developed, and in the other a worker. These gradually coalesced, and were finally blended into one.

2. "The process of development can be more easily explained in accordance with the Dzierzon theory of the origin of drones from unimpregnated eggs. Thus the egg contains the male individual *in potentia;* the spermatozoid contains the female germ *in potentia.* The development of all creatures consists in the blending of the germ of the spermatozoid, with the germ of the egg. In the development of the worker, the germ of the spermatozoid predominates in such a manner, through impregnation, that it (the female) is fostered and produced. In the case before us both became developed, though imperfectly, so that the spermatozoidal germ produced the head and thorax, and the egg-germ produced the abdomen."

In the fall of 1857, Mr. Samuel Wagner, of York, (Pa.) communicated to me a theory on the origin of drones and workers, the object of which was to show *how* the same egg might produce a worker or a drone, according as it was or was not impregnated—the fact that a drone comes from an unimpregnated egg, and a worker from an impregnated one, having been put on the basis of complete demonstration by the dissections of Prof. Von Siebold. (See *Langstroth on the Hive and Honey Bee,* page 41, 3d edition.)

Mr. Wagner's theory, for substance, was that there are two germs in every impregnated egg, one male and the other female; the male germ being derived from the queen, and the female from the drone—each sex tending naturally to produce opposite sexuality. When the egg is not impregnated by spermatozoids, it contains a male germ only; and from it, when hatched, a drone will be developed. When the egg is impregnated, two germs are present; but the female germ, being the more vigorous and energetic, grows more rapidly (as is evidenced by the fact that the worker reaches maturity sooner than the drone,) and absorbs all the nutriment; while the more sluggish male germ either remains dormant, or after a brief and ineffectual "struggle for life," succumbs and perishes. There is something analogous to this in the growth of one bud on a plant, which is often so rapid and vigorous, that the other and adjoining buds remain dormant or die soon after beginning to grow.

Prof. Joseph Leidy, of Philadelphia, the celebrated microscopical anatomist and physiologist, when asked to dissect the impregnated eggs of the bee, to see whether he could not find there two germs, informed me that the demonstration of such a double germ was beyond the reach of any skill then possessed.

It will be seen that Dr. Dönhoff's theory closely resembles that of Mr. Wagner; and the discovery of these mongrel bees, gives a new interest to the whole matter. If two germs exist in every impregnated egg, then it is easy to conceive how, under some peculiar circumstances, both may grow and the result be a *monster*—the germs growing into each other, like other monsters in the animal and vegetable kingdoms; neither germ being able to overcome the other, or to obtain sufficient nutriment for its complete separate development.

The facts already established in the physiology of the honey bee, have overthrown many opinions previously regarded as demonstrably true; and a wide field is open, especially to medical and scientific men, for further investigations.

Oxford, Ohio. L. L. LANGSTROTH.

* Dr. Donhoff's reports on these anomalous bees will be given in the next number of the Bee Journal. [*Ed.*]

☞It is a common notion that a colony whose drones begin to fly before eight o'clock in the forenoon, will send forth a swarm on the same day. This is by no means a reliable criterion, for I have often seen drones flying before that hour, and on one occasion before five o'clock in the morning, from a colony whose bees were hanging out in clusters; yet no swarm issued, either on that or the following day. A. BRAUN.

(From the "Bienenzeitung.")

The Coloring Matter of Wax.

BY DR. DÖNHOFF.

When honeycomb is melted and run into very thin flakes, we find that the unbleached wax is of a clear, bright-yellow color. When it is run into somewhat thicker flakes, the color deepens to an orange hue.

This results from the fact, that the originally snow-white wax of the comb acquired in the hive, in process of time, a bright-yellow color, even if the cells never contained honey or brood. This color is always deepest or darkest in old comb. When old dark-colored comb is melted, a black, insoluble sediment will be deposited, and a deeply orange-tinged wax will flow off. The interior surface of the sides and top-board of a well stocked hive will, sooner or later, at least in parts or spots, assume the same tint. This yellow coloring matter is essentially difierent in hue, from the golden or orange-tinge which characterizes the uncrystallizable sugar of honey. How does it originate? I have made the following observations and experiments:

1. I kept honey several months in a wooden box, placing it alternately on a stove and in a cellar. The interior surface of the top of the box did not assume a yellow tinge; neither did the sides, which were in constant contact with the honey. A few drops of a dull, orange-colored water, were condensed on the inner side of the top.

2. I placed pollen combs, brood combs, and slats covered with propolis in newly planed boxes. The color of the interior remained entirely unaffected by the contents.

3. I placed a wooden box, containing new, clean comb, in a hive having ample stores of honey, pollen and propolis, from which the bees had just been expelled; and exposed the whole alternately to heat and cold. The combs and the inside of the box remained unchanged in color.

4. I melted together recently built comb and the freshly gathered honey it contained, mixing the mass thoroughly, by stirring it well. On cooling, I drained off the honey. The wax remained white.

5. I introduced a colony of bees, this spring, into a hive well furnished with empty combs, and gave them at first only half a pound of honey, but subsequently supplied them with six pounds of sugar dissolved in water. The weather was still too cold to permit the bees to fly. When the dissolved sugar was carried up, and I found in the cells and in the honey-bags of the bees, only pellucid sugar water, I placed a small wooden box in the hive immediately below the cluster of bees. In a few days, the box became tinged a bright yellow, in spots. I repeatedly placed in the hive, small wooden troughs containing moistened loaf sugar. This was soon densely covered with bees, and in from four to twelve hours, I uniformly found the troughs tinged with a bright-yellow hue, particularly where the sugar had been in contact with their sides. When allowed to remain several days, the troughs assumed an orange color.

6. I placed in the hive a small box with sugar, setting it on a white board and elevating it just high enough not to permit bees to get between it and the board. Nevertheless, I soon found yellowish spots on the latter.

7. I cut this board in pieces, placed them in a porcelain cup, poured alcohol on them, and set it to boil over a spirit lamp. The alcohol was soon tinged with yellow, and on evaporation left an orange-colored residuum. The yellow spots disappeared from the wood, and the residuum, on being tested, exhibited no indication of containing sugar.

8. I placed honey in cold alcohol, which extracted the syrup, but not the coloring matter. Hot alcohol dissolves the grape sugar of honey.

What results were thus obtained?

A. From experiments 1, 2 and 3, it is evident that neither honey, nor pollen, nor propolis contain exhalable coloring matter.

B. Experiments 4 and 5, show that the yellow coloring matter emanates from the bees.

C. From experiment 6, it is manifest that the color is not communicated to the wax by the proboscis of the bees, as Huber thought. As it appeared in places inaccessible to the bees, it must have been conveyed thither in exhalations emanating from them.

D. From experiments 5 and 6, it seems, moreover, to follow that this coloring matter is exhaled by the bees, even when they do not consume honey.

[For the "Bee Journal."]

I will now tell you what my bees have done. Last June I had two old stocks. One threw off a swarm on the 3d of June, which I saved. In about ten days it swarmed again, and once more on the third day after—thus making three swarms from that hive. The other swarmed four times, the same month—making from the two stocks seven young swarms, of which six have *died*. "Too much pork for a shilling."

Southampton, Mass. L. P. W.

[For the "Bee Journal."]

To keep Frames firm.

It is, in many cases, important to know how to keep the frames in the Langstroth hive securely in place—so as to admit of safe transportation—without interfering with the easy removal of the combs.

Bees, in order to give their combs greater strength, usually build them more or less waving.* To remove them safely from the hive, it therefore becomes necessary, either to allow some play between the frames on which they are built, or to take them out, as in the Berlepsch plan, (see No. 1 of the Bee Journal,) from one end of the hive. If any play is left, there is danger of the frames sliding too close together when the hives are moved.

In the Bee Journal for March, a method to keep the frames firm is given by *Apis*. I believe the plan devised by me more than a year ago, and tested fully last summer by a number of experienced beekeepers, is preferable to that of *Apis*.

A brad or tack (better still, a small staple, such as is used to fasten the slats of blinds,) is driven into each end of the uprights of the frames, about half-an-inch from their bottoms, and so as to project three-eighths of an inch. In order to be able to change any frame end for end, and not have these brads interfere with each other, one should be driven on that side of the front upright, facing you when you look at a frame, and the other on the opposite side of the back upright. These brads will prevent the frames from ever getting so close on their sides or bottoms as to injure combs or bees, and yet will not at all interfere with the play between the tops of the frames, so necessary for their safe and easy removal.

As one upright of each end frame will have no brad, two nails or pieces of wood must be fastened, one near the front left-hand corner of the hive, and the other near the opposite rear corner, and projecting three-eighths of an inch from the sides of the hive—so as to keep the front of one end frame and the rear of the other, from coming too close to the walls of the hive.

To keep the frames from sliding too near the front or rear walls of the hive, drive brads into the uprights about one inch from their bottoms, on the sides facing the walls of the hive, and projecting one-quarter of an inch. These brads will still allow a play to the frames, from front to rear, or from rear to front, one-eighth of an inch, which is enough to loosen the frames when fastened to the rabbets by propolis, without crushing bees. They also greatly facilitate the safe removal of a frame, as the front or rear brad may be made to bear against the wall of the hive, so as to *steady* the frame when it is lifted out, and prevent the uprights from hitting the sides of the hive and crushing bees.

With these brads, a hive may be safely transported to any distance, unless exposed to very rough handling; and any frame may be more readily taken out than when no brads are used. If the hive is to be moved over rough roads, a few wads of paper or cotton, crowded between the frames where they rest on the rabbets, will make all secure. By placing two strips of wood on the frames where they rest on the rabbets, so as to fill the space between them and the honey-board, and then screwing this board fast, the hives might be turned upside down, or subjected to any usage which would not break the combs. The cost of these brads is only a few cents to a hive; and any frame may be put in any place, or reversed, without any interference.

Brads might be put on the alternate edges of the tops of the frames, so as to keep them at the proper distances from each other; but they would often seriously interfere with the play necessary for the safe removal of combs. When a hive is first used, two notched patterns will quickly adjust the frames, which should be slightly bradded fast to the rabbets before the patterns are removed.

The projections of the brads, are such as to suit the size of frames given in my book—the tops being one inch wide, and not, as in some of the editions, 1⅛ inch wide.

Oxford, Ohio. L. L. LANGSTROTH.

[For the "Bee Journal."]

Last year, there were probably not over twenty natural swarms in this county. Nearly all the increase was artificial. After the first of July, bees did very well, collecting honey; but the swarming season was past.

I have the statement of a man, who is said to be reliable, living in our county, that he took off a top box from one of his hives, which contained 114 lbs. of honey collected last season. This box must have been considerably larger than those used by Langstroth or Quinby.

What is the difference in Harbison's movable comb frames, and Langstroth's?

Van Wert, Ohio. A. W. B.

☞Please send us the names of beekeepers.

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*The plan of corrugating metal plates, in order to secure more strength, might easily have been suggested by the architecture of bees.

[For the "Bee Journal."]

Fertility of the Queen.

Says Mr. Langstroth in his excellent treatise on "the Hive and Honey Bee," p. 32, "the fertility of the queen bee has been entirely under-estimated by most writers. During the height of the breeding season, she will often, under favorable circumstances, lay from two to three thousand eggs a day!"

Mr. Quinby estimates that the queen will lay from 1500 to 2000 eggs a day.—See his "Mysteries," pages 72 and 378.

Harbison—see page 75 of his "Bees and Bee-keeping"—is of the opinion that the queen can deposit 2000 eggs a day.

Reaumer, I am informed, thought the queen would lay 400 eggs a day: Huber's opinion was that, in the prime of the season, in April and May, about 12000 eggs are laid, which is at the rate of something like 200 a day. The various estimates, by ancient and modern writers, are that the queen can lay from 200 to 3000 eggs a day, and from 30,000 to 250,000 eggs during the year. And even at the *present* time, there are writers entertaining the same opinions. Why should there, at the present time, be such a diversity of opinions? The only reason that can be given in explanation, is this: *Writers do not investigate the matter for themselves.*

We have now every facility necessary to investigate this matter properly, to enable every bee-keeper to ascertain, with some definiteness, the fertility of the queen. All that is necessary at first, is to have a hive that will give the operator full control over the contents. Rev. L. L. Langstroth's movable comb hive will give the operator perfect control of the bees, and of every comb and cell within the hive.

Late in the season of 1859—if my memory serves me correctly, I think it was either in the latter part of July, or *early* in August—I took out the combs from one of my movable comb hives, and ascertained by *actual count* the number of cells containing eggs, larvæ and sealed brood. This colony was in possession of a young queen reared artificially,—being only about six weeks old. The *modus operandi* was as follows: Commenced on one side of the hive and lifted out the first or outside comb. The bees, by a sudden jerk, were shaken off of the comb, thereby leaving the cells in good condition for examination. This comb was taken away to a room, that robber bees might not be induced to carry away the honey. The cells having eggs, larvæ and sealed brood were carefully counted, when the comb was returned to the hive. The next comb was then served in a similar manner; also the remaining combs, in all consisting of eight. The hives I now use have *ten* combs.

Below will be found a Chart of the result of this examination. This is the first Chart of the kind, to my knowledge, ever made.

The Chart is as follows:

Where placed.	Eggs.	Larvæ.	Chrysalids or Sealed Brood.	Total of Eggs, Larvæ, and Chrysalis.
1st side of 1st comb,	206*			206*
2d " "	374*			374*
Both sides "	580*			580*
1st side of 2d comb,	32			32
2d " "				
Both sides "	32			32
1st side of 3d comb,	980	85	274	1339
2d " "	1323	56	205	1584
Both sides "	2303	141	479	2923
1st side of 4th comb,	206	899	837	1942
" "		247*	46*	293*
2d side "	64	915	808	1787
" "		324*	45*	369*
Both sides "	270	2385	1736	4391
1st side of 5th comb,	42		254	296
2d " "	132		237	369
Both sides "	174		491	665
1st side of 6th comb,	57	208	1122	1387
2d " "	52	127	977	1156
Both sides "	109	335	2099	2543
1st side of 7th comb,	51	477	1275	1803
" "		62*		62*
2d side "		19*		19*
" "	32	367	1256	1655
Both sides "	83	925	2531	3539
1st side of 8th comb,	81	459		540
2d " "	11	109	106	226
Both sides "	92	568	106	766
Total,	3643	4354	7442	15439

* Eggs, Larvæ, and Chrysalids, in drone or store cells.

We deduce from this Chart, the following results: The eggs, larvæ and sealed brood in worker-cells amount to 14,116; the same in drone or store-cells, 1323. Ninety-one cells contain *sealed* drone-brood.

It usually requires in this latitude—43° North

—21 days to perfect workers, and 24 days to perfect drones, from the time the eggs are deposited.

But as drone-larvæ are usually *sealed* on the 9th day after the eggs are laid, it will be obvious that the ninety-one cells containing the *sealed* drone-brood, taken from the whole number of cells occupied—15,439—will leave 15,348—as the number of eggs deposited *within* the 21 days; which gives an average of 730 eggs a day. The whole number of eggs and larvæ amounts to 7,997. The time that is necessary to elapse from the deposition of eggs in either worker or drone-cells, till the larvæ are *sealed*, depends very materially on the *temperature*. We will, in this case, presume that the eggs and larvæ in worker and drone-cells were the result of nine days' laying of the queen, which would give an average of 888 eggs per day. Also, much depends on the temperature in hatching the eggs. The whole number of eggs was 3,643. If it required three days to hatch the eggs, the average per day is 1,214; or, if but 60 hours —two and one-half days—an average of 1,457.

By the facts herein presented we may prove, or disprove, many theories—ancient or modern. I will disprove one and but one. In the "*Natural History of Insects*," issued by Harper and Brothers in 1839, I find the following extract: "The queen must be at least *eleven months* old, before she begins to lay the eggs of *males*." This theory, I believe, is also concurred in, to some extent, by writers of the present day. Every reader must detect the fallacy of this theory, as the queen in the colony I examined was not far from *six weeks* old, and yet the cells contained drone or male brood *sealed*. There are many other theories that might as easily be proved, or disproved, but I will leave them for the present, for other readers and writers of the Journal.

Readers of the "Bee Journal," I am not satisfied with the results given in regard to the fertility of the queen. Since that examination, I have become convinced that the queen can deposit a far greater number of eggs within the time specified in the foregoing deductions. That examination was too late in the season—the combs were too well supplied with honey. I have, however, no reliable facts to present to confirm my belief. My opinion is, therefore, that a young, prolific queen can deposit, under favorable circumstances, 2,500 eggs per day, for a period of twenty-one days, or upwards of 50,000 eggs!

I am in hopes that I shall be able, the present season, to present *facts* to the readers of the Bee Journal to that effect. I would invite others who have the time and patience, to also institute similar experiments with myself. My mode of experimenting the present season, will doubtless be as follows:—I propose to select, either in June or July, a good strong colony, in possession of a young fertile queen; probably *two* colonies, one having a young fertile *native* queen, the other a young fertile *Italian*. Three of the combs most central I will then remove, and introduce therein immediately three empty worker combs. This will be done at a particular time either in the A. M., or in the P. M. Every 72 hours thereafter, for a period of 21 days, I will take out these central combs and supply their places with empty worker combs. The combs taken out, excepting those taken out when the colonies are selected, I will examine and ascertain, by actual count, the number of eggs, and larvæ if any be hatched. The result, of course, at each examination will be registered in a book kept for the purpose. In like manner I would proceed with the other six examinations. In the meantime, combs of larvæ or brood just *sealed*, which may readily be obtained from other colonies in the apiary, should occupy the most of the room on either side of the three central combs, so that the deposition of eggs may be wholly confined to those central combs. The combs taken out for examination will be given to other colonies, so that no loss need be incurred. Farther directions need not be given—in fact some of the foregoing might be omitted—as I expect that scarcely any but *practical* beekeepers, who are aware of the value of the facts we wish to ascertain, will experiment for the purpose of determining the fertility of the queen. When the fertility of the queen is once established, then we shall have the data by which we can construct a bee hive, as regards the *size*, on purely scientific principles.

Some queens, it is true, are more prolific than others, even of the same age; but the *average* of their fertility may be pretty nearly ascertained in a very short time, *provided* a large number of beekeepers experiment at the same time and in the same manner. Who among the many practical apiarians that read the "Bee Journal," will also experiment as designated? Let the fertility of the queen, respecting which there is at present such a diversity of opinion, become settled as speedily as possible.

M. M. BALDRIDGE.

Middleport, Niagara Co., N. Y.

☞Instances are on record where the drone-brood was destroyed, by the bees, twice in succession in the spring. Only that of the third laying was permitted to mature. On each occasion about 1200 eggs were laid.

[For the "Bee Journal."]

I received, a few days since, several numbers of "*L'Apiculteur*," a French Bee Journal published in Paris monthly, and now in its fifth year. The numbers received contain articles of all kinds, practical, speculative and comic. Our foreign friend is disposed to season everything with a little fun. The following translated from the February number, on the introduction of queens, will excite the curiosity of all who are interested in the Italian bee and also those who practice the union of feeble colonies. We hope soon to be made aware of the *modus operandi*. Although we cannot complain of our success, we should like to know the safest and most expeditious way.

From the Bienenzeitung, July, 1860, page 157.

"I have had the good fortune to discover a process by which a queen can be introduced to any hive without the least danger of loss of her life, and without any precaution for her protection; for the queen, whether she be fertile or not, is always and to a certainty accepted, even in a hive that may contain another queen, fertile or not, or even a fertile worker.

"The operation occupies but a moment, requires only a very slight expense, no skill nor preparation, and is applicable to all kinds of hives, with or without movable frames. It is, in fact, a process which forms a new era in apiculture; especially if the Italian race is to be generally introduced; for, by it, all danger to the life of the queen vanishes.

"I do not desire to keep this process a secret, by which both time and money may be saved, and I therefore offer to communicate it, by printed instructions, to those beekeepers who will send me a thaler, (about 75 cts.) and to do so as soon as the number of applicants reach a figure to satisfy my views. But to escape any reproach of charlatanism or of avarice, I hereby declare that I will appropriate all I thus obtain, for the benefit of the Beekeeper's Association. For the sake of making this sum as large as possible, I impose upon each one the condition of secresy.

Altenburg, June 22, 1860. HÜBLER."

The Baron of Berlepsch, having visited Mr. Hubler to test the process, sent the following note to the Editor of the Bienenzeitung:

"I have just returned from Altenburg, having passed eight days with Hübler, and I am thoroughly convinced that he has discovered a method by which the safe introduction of a queen is rendered almost infallible. He takes away, for instance, a fertile queen and substitutes one that is not. This latter is with certainty accepted by the colony. He does even more than this; Without taking the trouble to remove the fertile queen, he introduces one in the hive not fertile. The next morning the *first* is dead and the *second* is filling her position.

"Has not this altogether an air of mystery? Nevertheless nothing is truer. Those who know Hübler's method, understand why it is so and not otherwise.

Gotha, Aug. 11, 1860. VON BERLEPSCH."

"The foregoing having been read to the society and they having full confidence in Mr. Hübler as an honorable man, charged their Secretary to write to him, offering to pay him for his printed directions, and if the process proved efficacious, they resolved to award him a valuable premium. One of the members feared there might be some *Rareyism* in the process; but he was open to conviction and wished for light on the subject."

We hope those who have experimented in raising and introducing queens, will make known their success, in time to benefit others the coming season. E. P.

☞The process of safely introducing a queen, referred to in the above communication, was thus described by Mr. Hübler, at the late Convention of German Beekeepers, in the city of Hanover:

"When a queen is to be introduced, the bees of the colony are previously to be stupefied with the fumes of the common fungus, known as puff or puck ball (*Lycoperdon bovista*). When the bees cease humming and drop, the hive is opened to admit fresh air; and the queen to be introduced is then placed on the stupefied mass, into which she will immediately creep and remain quiet.

The following particulars are to be observed:

1. The operation should be undertaken only in the evening, shortly before dusk, and the entire mass of the bees be exposed to the fumes of the fungus.

2. The stupefied bees must not be confined while reviving, or feel as though they were under restraint, or they will commence fanning violently and many of them die from exhaustion.

3. It is not safe to stupefy bees in the spring, til after they have had an opportunity to fly and discharge their fœces, or they will soil themselves while in a state of stupefaction. At other times they may indeed disgorge the honey with which their stomachs are filled, but this does no injury.

4. When a virgin queen is to be substituted for a fertile one, the colony must first, by the removal of the latter, be made to feel its queenless condition, and the consequent excitement be allowed to subside.

5. It is not necessary that the offered queen be confined or protected.

6. When a drone-breeding colony is to be operated on, no special preparation is necessary. It may be fumigated at once, and the queen placed on the fallen cluster. But I have, in such cases, never offered any other than fertile queens. Whether a virgin queen would be accepted, I am unable to say.

7. Fumigation with this fungus is the readiest and safest mode of strengthening colonies, by the introduction of bees from other hives. They will be received without hesitation.

8. I do not think it advisable to fumigate bees late in the fall, when they may have no opportunity to fly out after the operation. It seems to me that bees fumigated so late in the season, do not winter as well as others.

9. I have not obtained favorable results when I used other substances for fumigation.

In August, 1859, I transferred a colony from

one movable comb hive to another. After lifting out the last comb, about a thousand bees remained in the hive. I intended to give them a young Italian queen, and as they were much scattered and I did not wish to brush them together, I fumigated them and cast the queen among them to see how she would fare. Next morning I found her hale and active among her companions, and the old queen, undesignedly present, lay dead on the bottom board. The young queen soon became fertile. Future experiments will doubtless lead to the discovery of other singularities."

Thus far Hübler. We would remark that great caution is indispensably required in the fumigation of bees with puck-ball fungus, or they may be stupefied *beyond recovery*—literally suffocated.

Years ago, Mr. Suda, a correspondent of the Bienenzeitung, must have been on the verge of discovering this mode of introducing a queen. We find the following passage in an article "on the changing of queens," written by him and published in that Journal for Nov. 1, 1853:—

"If I had had fertile young queens at my disposal at the close of last summer, I would have tried the experiment of stupefying, with the fumes of puck-ball, a colony containing an old queen, and thereupon introducing among them a young one in company with a small body of workers, to ascertain whether these would not have maintained the upper-hand."

Possibly Mr. Hübler took a hint from this.

☞Bees will gather *honey* from different species of plants or flowers, during the same excursion—passing freely from one kind to another. But they confine themselves to one and the same species when collecting *pollen*. It is easy for an observer to satisfy himself of the fact that a bee is gathering honey *only*, from some flower or blossom; but when he sees a bee collecting pollen, it is not so easy a matter for him to assure himself that she is not gathering honey also.

☞There are for the bees three harvest seasons in every year—spring, summer and autumn. If only one of these yield abundantly, the bees will secure a supply for all their prospective wants; and so likewise if all three are only moderately good. When they can gather plentifully during two of them, they secure a supply and a surplus; and when all three yield amply, there will be a superabundance of stores. As a general rule, destitution and starvation will only occur among bees which are diseased or mismanaged; especially when by improper or excessive pruning in the spring, they are constrained to use for comb-building, the avails of the early harvest and the later ones prove to be meagre.

[For the "American Bee Journal."]

It is interesting to know at what height above the level of the sea, bee culture may be successfully prosecuted in any country. The following is a list of places in Thuringia, at which the business has been many years pursued with profit; with their elevation respectively above the level of the German ocean.

Jena,	450 feet.
Rudolstadt,	624 "
Schwarza,	648 "
Blankenberg,	681 "
Swalfeld,	718 "
Weimar,	721 "
Watzdorf,	755 "
Leutnitz,	806 "
Upper Rottenbach,	878 "
Eichfeld,	889 "
Solsdorf,	900 "
Arnstadt,	903 "
Leutenberg,	921 "
Lower Wirbach,	929 "
Teichel,	958 "
Köditz,	969 "
Miltiz,	971 "
Thalendorf,	972 "
Ziegenheim,	985 "
Little Görlitz,	1031 "
Lower Weissbach,	1033 "
Great Görlitz,	1049 "
Schwartzburg,	1070 "
Keelhau,	1098 "
Allendorf,	1100 "
Paulinzella,	1108 "
Königses,	1158 "
Bechstedt,	1200 "
Lichstedt,	1222 "
Hengelbach,	1310 "
Katzhütte,	1337 "
Böhlscheiben,	1491 "
Upper Wirbach,	1602 "
Upper Hayn,	1790 "
Meura,	1800 "
Braunsdorf,	1904 "

At the place last mentioned, twelve colonies produced 108 lbs. of honey and 22 lbs. of wax, in 1853. The bees were kept in ordinary hives, managed on the *nadiring* system, and were not treated with any special skill or attention. A more judicious mode of management would unquestionably have insured a greater yield; for, at periods when the bees in the valley below could gather very little, those at Braunsdorf had the most abundant pasturage. The general complaint there, is that the bees rarely swarm.

[For the "Bee Journal."]

Nov. 30th, 1859, I put thirty-six swarms of bees into a clamp made by digging a trench 3 feet deep and 2 ft. 6 in. wide. Over this trench, strips of plank are laid to support the hives—three on the lower tier, two on the second and three on the top. Boards about seven feet in length are set upon the ground, forming a roof about six feet in height. The boards are then covered with a thick coating of hay, over which five or six inches of dirt is thrown and suffered to freeze. After freezing, another coating of hay is put on. The ends are covered in the same way, forming a hipped roof. Near the bottom of each end is inserted a length of drain-pipe 5 inches in diameter, or a wooden box 4 or 5 inches square, and at the top, one of 2 inches. These serve for ventilation and to insert a thermometer to ascertain the temperature of the clamp. The openings at the bottom are to be closed during the coldest weather.

On the 16th of March, 1860, I opened the clamp and took out the bees, having been confined 108 days. Of the 36 swarms, five died. I weighed eleven swarms, when I put them in and when I took them out. They had shrunk in weight 78½ pounds, averaging a little over seven pounds per swarm. The clamp was too small; the hives being packed as close as they well could be. The ventilation was not sufficient, and some of the last days they remained in, the thermometer rose to nearly 60°. In some of the hives the bees became restless, and many dead bees were found on the bottom boards. The thermometer, through the cold weather, was from 34° to 40°. My bees, not in the clamp, consumed a much larger quantity of honey than those in the clamp. The majority of the swarms were in the Langstroth hive.

Dec. 1st, 1860, I put sixteen swarms into the same clamp, and gave them more ventilation than last year. These I did not weigh. I opened them March 29th, 1861, having been in 119 days. Of these, four swarms died. The thermometer ranged from 30° to 42°. Some of the combs near the bottom and sides of the hives were mouldy; but most of these were strong in bees. About half of these were Italian queens impregnated by common drones.

On the 4th of Dec. I put fifteen swarms into another clamp, and ventilated them still more. All of these I weighed, both at the closing and the opening of the clamp. I opened them March 30, 1861, having been in 117 days. One swarm I found dead. The remaining fourteen weighed 84 pounds less than when put in. The average consumption was six pounds per swarm—varying from 3½ to 12½ pounds. The thermometer ranged in this clamp from 28° to 40°. All of these were hybrid queens, with the exception of one pure Italian, which I obtained from Mr. Parsons of Flushing, N. Y., the 20th day of last July. I converted the most of my stocks from the common to the Italian queens after that time. The Italian queen laid no drone-eggs after I got her; and I was compelled to go in for hybrids alone. I think I took away from her, eggs and brood enough last fall, in raising hybrid queens, to make two large swarms. I had to feed my bees while raising the hybrid queens; which I did with syrup, made of Havana sugar. Many of my stocks became reduced, while experimenting last fall. The hybrid queens that had a full stock of bees, had sealed brood and eggs in abundance, when I opened them this spring. My pure Italian queen had eggs, but she had not as much brood as some of my hybrid queens, which had a larger stock of bees.

One Italian queen, which I kept in the house, died in the winter. While taking eggs from this queen in October last, I found a queen-cell sealed. This I took out and gave to a nucleus, which raised a queen from it. A short time after, I found another queen-cell sealed.—This I also removed. I considered it very anomalous at the time, that a young queen, and one also very prolific late in October, should make preparations for a successor. She appeared well and active, and remained so the first of the winter; but on opening the hive in February, I found her dead. *Query?*—Had she not in October premonitions of disease, and did not instinct teach her, at that uncommon season of the year, to provide for the emergency her swarm met in the midst of winter? She was introduced to a common stock of bees sometime in August last. Much brood and eggs were taken from her for nuclei. Still the great majority of the swarm, on going into winter quarters, was Italians. When I found the dead queen, I noticed there were but few Italian bees among the dead, while the living seemed almost all Italians. I had the curiosity to count them, and out of more than one thousand there were not fifty dead Italians. Many stocks of bees have been lost this last winter; and some strong stocks, not in clamps, with plenty of honey, have died.

HORACE P. WAKEFIELD.

Reading, Mass., April 6th, 1861.

☞The bees do not deposit in the cells all the pollen they gather. Many of the pellets are taken from the gatherers as they return with laden thighs, and are at once consumed by the greedy workers, to qualify themselves for secreting wax or preparing food for the older larvæ.

Movable Frames.

Several of our correspondents have inquired whether the frames in movable comb hives should not be permanently fixed at some definite distance apart. Our own experience has taught us, that such precision and uniformity are at least not indispensable, and are indeed to some extent impracticable, without interfering unduly, at times, with the operations of the bees. It has been supposed that the proper distance could be determined, by ascertaining that which the bees instinctively adopt in ordinary hives. But investigation has shown that the bees observe no uniform rule or practice in this particular. Dzierzon found many remarkable deviations, and says that though the usual average for brood combs is 1½ in. (Silesian measure,) apart, yet in a large number of oblong hives which he inspected, the average was 1⅔ in., measuring from the middle of one comb to the middle of the next. Mr. Wieprecht examined eight colonies in common hives, and ascertained by measurement, that the distance at which the combs were placed apart, was different in all of them. The average distance apart of all the combs was 1¼ in. (Rhenish measure), and of the brood-combs 1 7-16ths in. This, except as to the brood-combs, differs considerably from what is usually supposed to be the arrangement in such hives—namely, that the store-combs are placed farther apart than the brood-combs, when bees are free to follow their own instincts. It shows also that the distance apart at which frames for such combs are usually set in movable comb hives, is slightly greater than that which bees naturally prefer and would adopt.—Dzierzon directs the bars with guide-combs to be placed 1½ in. apart, from centre to centre; his inspection of numerous hives and long practice having taught him that such was *about* the proper distance for brood-combs. His inch, however, is Silesian measure, of which 13 inches make a Rhenish or English foot—thus giving very nearly the same distance apart, for brood-combs, as ascertained by Mr. Wieprecht (1 7-16ths in.). According to Dzierzon's latest remarks on the subject, the top of the frames should be one Siberian inch in breadth, and the intervening space one-half inch or the depth of a worker-cell in new brood-comb. Yet, extreme accuracy is not required, as the bees manifestly do not observe it themselves. In parts of the hive where store-combs are usually placed, still less precision is necessary. Either four or five frames may be arranged in a space of seven inches, as thicker or thinner store-combs are desired. Thick honey combs are usually preferred; but thin ones are more conveniently handled.

It follows, of course, that the width of a hive need not necessarily be adapted for a given number of frames set at precise distances apart. The same number of frames cannot always be conveniently used—owing to casual circumstances which cannot be foreseen. Thus, in making an artificial colony, it may be desirable to supply it with honey in the comb, when none but thick honey combs are at hand. We may hence be constrained to arrange the rest of frames differently from what we might prefer, and be able to use only eleven in place of twelve.

[For the "Bee Journal."]

As it is time to feed bees, and there are many hives needing this help, I would like to ask through the Bee Journal, what is the best kind of food and the best way to give it. If some one with experience in this matter would give us all or nearly all of the *particulars*, it would greatly assist many. Is not a particular kind of food more suitable at one season than at another, and would there not be a difference in which part of the hive to place it? If good coffee sugar, slightly moistened, is the best for spring, it has just occurred to me, that it could be best fed to bees in gums or the common box hives, by means of a cylindrical box made of wire cloth or perforated tin. Let it be 1¼ inch in diameter, and 4 or 6 inches long, the top open with a flare or shoulder to hold the box to the top of the hive, through which it enters by means of a 1½ inch diameter hole. When the box is adjusted, (by breaking away comb sufficient to let it enter,) fill it with sugar, and cover with a woollen cloth weighted down by a brick. Thus the food is offered at the inside of the hive, to the mutual convenience of the feeder and the fed.

Jacksonville, Illinois. H. T. Collins.

☞A singular buzzing is sometimes heard, even late in the spring, in young and healthy colonies which have much brood to nurse. This is no evidence of feebleness, but that they are suffering from cold. To be able accurately to judge of and interpret the peculiar buzzing of bees at various times and under different circumstances, is no slight acquisition. He who can do it promptly and correctly, has mastered many of the arcana in the economy of the hive.

☞Bees do not consume most honey during extreme cold weather, but during intervals of milder temperature.

☞Colonies which have a vacant space below the combs, will winter better than those whose combs extend down to the bottom board.

Curious Cases.

Dzierzon observed a second swarm issue from a colony whose recently emerged queen he had removed a few hours before, and which contained only an embryo queen in a royal cell. He inferred that the bees, being ready to swarm, had not yet discovered the absence of their queen when they issued. It would seem from this also, that the signal for swarming is not given by the queen.

Mr. Kaden saw a swarm issuing a second time, from a hive which had swarmed on the previous day and lost its queen. Probably the mass of the bees remained in ignorance of their loss, and issued under an impression that the queen would follow.

Mr. Vogel reports a case where a colony exhibited signs of queenlessness, though actually in possession of a queen. This was undoubtedly caused by an attack made on the queen, endangering her life. Such attacks are sometimes made by strange bees, which enter the hive either by design or mistake. Under such circumstances, fearing the worst, bees will frequently start royal cells before they become composed or assured of the queen's safety.

Bees have retentive memories. Dzierzon once gave a fertile queen to a bereaved colony, and she speedily supplied all the brood-combs with eggs. He discovered soon after, that she had been killed; and introduced another, which encountered the same fate. He examined the combs and found a young queen just emerged, which had been reared from eggs or brood furnished by the first queen. The bees remembered their previous destitute condition, and took to rearing a queen as soon as supplied with requisite means.

The following occurrence took place in Dzierzon's apiary several years ago. One of his hives sent forth three strong swarms at intervals of about five days, though there was, meanwhile, not the slightest interruption in the laying of eggs. During the whole period, as well as afterwards, the combs contained eggs, larvæ and sealed brood, just like any healthy, strong colony that does not swarm. Here the old queen resolutely maintained her ground, and thus compelled the young ones, as they successively emerged, to accompany the swarms. Such cases are by no means rare. But suppose she had chosen to leave with the third swarm, and having crippled wings, had fallen to the ground and been found there by an inexperienced or unreflecting beekeeper, would he not have inferred that queen bees are fertile when hatched? Isolated cases may prove deceptive and misleading. Only the repeated observation of uniform phenomena, can form the basis of correct and reliable conclusions.

From the "Wabash Gazette."

One of the many remarkable sights here on the Fourth, was Mr. Twining and his Queen bee. He came into our office the day before, with an old plug hat. He had cut two holes in it about midway of the crown—one in front, the other in the back part. Holding the hat in his hand, and turning it over to show that it was empty, he said "you see that this hat is now empty. To-morrow I intend to have a swarm of bees at work in it, making honey, and I intend to wear it on my head with the bees in it!" Sure enough, on the Fourth, as were going out into the grove, we came across Mr. Twining. He was located under a shady tree, and was exhibiting to an admiring crowd of men and women, his wonderful patent bee hive. On his head was the identical hat that he had shown us the day before. It was literally covered all over with bees, busy at work, going in and out at the two orifices before mentioned. All the spare space in the hat was filled with new comb, that had been made within twelve hours. In his hand he held the Queen bee which he was showing to every one who would venture near enough to gaze on and admire the wonderful little insect. During all this time he was giving an eloquent and instructive lecture on the habits, worth, and care of bees. After listening for some time we left, feeling that what Twining did not know about bees was hardly worth knowing.—*July*, 1860.

☞Is not the opinion prevalent that bees station guards at the entrance of their hives, erroneous? Feeble colonies, and recent swarms domiciled in hives disproportionately large, have no such guards posted, though they, if any, would need them. When bees of populous hives well stocked with combs, are seen collected about the entrance, fanning, clustering, &c., is it not rather because ventilation is needed, or they are prevented from laboring within by the internal heat, than because their vigilance is required for the protection of the colony? True, when a hive is annoyed or attacked, hosts of workers promptly make their appearance at the entrance, evidently intent and prepared to repel assailants. But this is an occasional occurrence, having an obvious special cause; and is as transient as it is rare. Nor does the fanning party then participate in those martial demonstrations, but continues the ventilating operation with most intense devotedness and zeal.

☞There is a decided difference among bees as to industry in comb-building and honey-gathering, even where the location, weather and management are the same.

[From the Ohio Farmer.]

Beekeepers' Convention.

Thursday, March 14th, 1861.

Met in the Sons of Temperance Hall, Cleveland, Ohio. The President, Prof. J. P. Kirtland in the chair.

The first business being the election of officers, it was on motion postponed until two o'clock P. M.

The President, from the Committee to secure further legislation on the subject of increased protection for beekeepers, reported, which report was laid on the table until next day.

The question for discussion was that agreed to at the last meeting, "*What is the best form of hive?*" Which, on motion of J. Kirkpatrick, was divided so as to read "*whether hives with or without movable frames are best,*" and then, "*which hive of the two kinds is best.*"

J. Kirkpatrick opened the debate by saying that he was not prepared to bring anything new on the subject before the Association, and to his mind it seemed that anything said in favor of movable frames was superfluous, but would refer to the increased facilities in manipulating the bees, the increase of swarms by division, and the power to supply a queen, if one is lost.

Mr. Smith thought that division was unnatural; he admitted, with the previous speaker, that it may be overdone; that dividing by the natural method is the best. If the beekeeper, especially a new beginner, would first obtain experience with the stationary comb, before using the movable frames, it would be much better. Removing combs from the centre of the hive at certain times was very injurious, and inexperienced beekeepers were apt to do this. Intelligent beekeepers act differently.

S. C. Brown. I never lost a swarm of bees, except through carclessness, since I began to use the frames. Leaving things to nature will not always be for our interest, as we milk cows, shear sheep, &c., yet all are unnatural. The simplest form of a hive—for example, a hollow log—is the nearest nature, but is not the best or most profitable. My experience with movable frame hives is very favorable. As an experiment, I increased fourteen stocks to thirty-eight in one season, all of which did well, and produced a large quantity of honey.

Mr. Smith. Experience is necessary to success in using movable comb hives. He makes his bees pay good interest. He believes it the interest of every beekeeper to let his bees swarm naturally. It is not natural to divide hives by taking out a sheet of comb, and form a new colony before the proper time. They should be allowed to "secede" at their own time. New beginners, if they commence with the supposition that they can make any number of swarms by division, will lose more than if they let nature do the work. In answer to the question, "what is a proper sized hive?" he said, a proper sized hive, in my opinion, is one that will hold one bushel. If it is larger, the queen will not lay eggs sufficient to fill it. This has been tested by experiment.

S. C. Brown wants to know if it is "natural" to hive bees at all, or domesticate them. If it is natural to divide our cattle or sheep, why not our bees? It is no argument against certain hives that they are abused. I have used numerous kinds of hives, and followed nature till I was not able to keep my colonies good, and was forced to change.

J. Kirkpatrick. This idea of a state of nature, is not the question. Domesticated bees and cattle are not in a state of nature. The inexperienced man generally loses in whatever he undertakes. No other form of hive, except the movable frame, allows us to increase our swarms easily by artificial means; that we do this too rapidly, is no argument against the hive. To take comb from the centre of the colony, may annoy the bees, but this is of small account. We take the calf from its mother, because it is for our, and not their good. Several new hives are patented every year, which is evidence that there is a demand for new forms, giving greater control of bees. Every one admits that with movable frame hives, beekeepers are enabled to keep good the number of their swarms.

Mr. Sturtevant thought it was going backward to advocate the claims of the old box hive.

Dr. Kirtland. The object of our association is to elicit information about the culture of bees. We are living in an important epoch, so far as bee culture is concerned. Four years ago, after having tried almost everything, I contracted for a number of old box hives, and determined to go back to first principles; at that time, I was convinced the old-fashioned hive was the best. Four years' experience with movable comb frames, however, has convinced me that we have since made important advancement. There were no bee moths in the country till the commencement of the present century, and before that time bees did well *anywhere*. Since that, the moth has made beekeeping almost impossible. Patents had been devised to prevent injury from them, and before the movable comb hive no advancement had been made. I have been testing these hives, and insist they have made an entire change in bee cultivation. Till now, it was almost impossible to keep the number of your bee colonies good. Under the movable comb principle we have bee, honey and comb entirely under our control; you can look at, or handle them, and detect or remedy any want. This you cannot do with other hives. With movable frames I can discover anything wrong about the hive, without *guessing*—perhaps the queen is old or dead—you can discover it, and supply the worker-eggs for a new one, or a young queen. This alone is an important gain. Queenless colonies are numerous. In summer, your queen is liable to be destroyed, but you can detect it at once. Dividing swarms is no doubt overdone. Two years ago, I did it just right, but last year I divided them too much, and some of them are weak. I made three Italian colonies from a mere nucleus, which are now very heavy. *Could have done it in no other hive.* Ten or fifteen years is about the life time of a swarm in an old-fashioned hive, but in the movable frame hive a colony *never* becomes old. It is a perpetual corporation.

The census of the amount of bee colonies in different parts of the State, prove that there has been a great increase in number within a few years, and it is greatly owing to the movable comb frame hives. In no instance do I find large numbers of colonies belonging to persons without movable frame hives. They are as superior to

the old-fashioned bee hive as the threshing machine is to a flail.

Mr. Sturtevant. I know several large beekeepers who use Wicks' hive, but they are coming over to movable frame hives. It is a mistaken notion that we need more experience to use the movable comb hive than the old-fashioned box hive. By using brimstone, of course we can find out what is the matter with an ailing colony, but then it is too late to save the swarm. Men lose colonies in movable comb hives, and we always hear of it; but nothing is said of the numerous colonies destroyed in the old hives. Many are unwise, and carry the matter to an extreme in dividing swarms, but the principle is good, even if abused. It is intelligent care that gives success in bee culture, and this is only obtained by the movable comb hive.

Mr. Otis. Four years ago, I came to Cleveland to introduce the Movable Comb Hive, and met with cold rebuffs. The best men wers sick of patent bee hives. To-day, I am happy to find a different state of feeling. A large portion of the people of France use no other sweet than honey; indeed, this is the only sweet a large portion of the human race ever taste. It is the best and most natural of sweets. The strongest instinct bees have is to store honey; the next is the love of their offspring. One of the greatest hindrances to success is a surplus of honey. When this is the case, there is no room for eggs, and without them the stock soon becomes extinct. When weak, the moth enters the hive and finishes the work. They do not do this to injure the bee, but for food and heat to hatch their eggs. The moth is small and active; has bat's eyes, and works in the night; but you cannot entrap her in moth catchers. If she cannot enter the hive, she will deposit her eggs in the nearest place, where heat can be obtained, and bees carry them in themselves. I think bees carry more eggs into the hive than moths ever deposit there. Now we want a hive to give us control of the swarm, to prevent too great increase of honey, and injury by moths. The frames, while they do not injure the bees, give this control. It makes no difference whether the cavity for bees be a hollow log, a box, or a frame hive, but for their control it makes a great difference. Division of hives should be made at such times as bees can get material to work with; at other times, you remove comb that the queen might use in which to deposit eggs, and may result in other injury.

AFTERNOON SESSION.

Mr. Merriman is in favor of the movable comb frame hives. Formerly he was in the dark in regard to the best treatment of bees; but since the introduction of this hive, he feels as if he had got quite near to the light.

Mr. Smith had succeeded in supplying queens to hives destitute of them in the fall, by driving a weak, late swarm, having a queen, into the queenless hive.

Mr. Kirkpatrick would ask Mr. Smith how he would supply a queen in spring to a queenless colony?

Mr. Smith would in such case prefer a movable frame hive.

The discussion on this subject being then closed, it was

Resolved, That it is the opinion of this Association, that hives with movable comb frames are the best for beekeepers. Carried unanimously.

The second question, "*Which is the best form of the Movable Frame Hive?*" was then taken up and discussed.

Mr. Otis said he would give his opinions of a good bee hive. We have had numerous forms, but most of them have been failures. I will hear no man's opinion as to the best form, but go to the bee to determine. So far as the bees are concerned, the bee can store honey in one cavity as well as another; but in controlling them, there is much difference. The strongest instinct of the bee is to store honey. They cannot resist this disposition. A swarm of bees in May comes out at just the time to do well. The old saying "that a swarm in May is worth a load of hay;" "in June, a silver spoon;" "in July, they are not worth a fly," is very nearly true. A hive should be a simple cavity. All divisions in it do harm. The general opinion is, that it should contain about 2,200 square inches of comb surface. Why this is so, I think is because it gives sufficient room for the queen to deposit her eggs, for bee bread and a little surplus honey. The queen lays about three thousand eggs in a day. They hatch in twenty-three days. During this period, the queen will have filled most of the spare cells in a hive of this size. After one brood hatches out, the same cells can be used again for depositing eggs. For wintering bees, the form of an old-fashioned churn inverted, is perhaps the best. The queen lays her eggs in the highest empty cells, to take advantage of the ascending heat. Boxes for surplus honey should be placed on the hive as soon as heat can be spared from below to admit of it. These should be made small, so that the cards of honey will be of the right size for the table, and so that they can be removed at any time without too greatly shocking the bees, which is always the case if the boxes be large. With several small boxes, one can be taken away at any time without injury. This is why Mr. Langstroth uses small, instead of large boxes on his hive.

Mr. Flanders was in favor of the triangular form. It assists materially in keeping the hive clean. Cleanliness prevents the moth from doing so much injury. Strong odors and filth attract them. By using reversable comb frames, he could change the working economy of the bee, but not their instinct. He had yet to see combs on the triangular frame built irregularly.

Mr. Merriam stated that he had frequently seen irregular comb in such frames.

Mr. Kirkpatrick stated that he had used Langstroth's hive for several years, and it had met his expectations in every respect. The triangular hive allowed the manipulator to do several things, but are these things necessary?—There is no need of reversing the frames, for the bees are always clustered around their brood, and this secures sufficient heat; indeed, reversing the frames fails to secure extra heat, as intended.

Mr. R. C. Otis said that comb is always more or less irregular in form. Bees make it so, to secure greater strength. Comb for brood always has the same depth; for honey it has not. When a frame is once filled with good brood comb, it will last for years. I have reversed frames in hives, and could never induce queens to deposit

eggs in them. I believe such a course will ruin any colony. Any place in a hive, where a worm can find harbor, and the bee cannot follow, is objectionable. The queen will never go to a surplus honey box to deposit eggs, if all is right below. It ought to be understood that no form of hive will do for bees what was intended that man should do for them.—We can make steam engines and intricate machinery, but it won't run of itself; so with bee hives; the best of them must be looked after, and kept in good condition, or failure is certain.

Dr. Kirtland said that in twenty-three of Langstroth's hives, placed in a cellar this winter, with only three holes for ventilation, and closed at the bottom, he found sufficient carbonic acid gas accumulated to extinguish a candle. This gas is so heavy that it sinks to the bottom of the hive, and here I found a good many dead bees. This fact may be useful to patent hive makers.

Second Day's Proceedings.

The question of wintering bees was temporarily taken up this morning.

S. C. Brown said that, on Nov. 26th he buried several swarms, and took them out March 1st.—They had no ventilation, except through a covering of boards, earth and straw. The bottom of the hive was closed; on opening them, he found some power had pushed the blocks closing the bottom of the hive forward, so as to admit of the passage of air. He found them very strong, with few dead bees, and they had eaten less honey than bees above ground. His conclusion was, that bees properly buried are safer, give less trouble, and no anxiety. The uniform temperature kept them very quiet, which is very important. He wintered fifty hives in a house lined with straw. On Feb. 1st, he took them out to void excrement and replaced them till March 1st, but should have removed them a few days sooner, as they had become very uneasy. He found those hives placed on the floor did not do as well as those on the high shelves.

Dr. Kirtland suggested that the reason of the blocks closing the hives, being pushed forward, was, by the pressure of accumulated carbonic acid gas. It may have also been the cause of injury to the bees on the floor in the room lined with straw.

Mr. R. C. Otis said the beekeeper should always ask the *why* of any of his failures. There is a *cause* for all of them, and if we ask this question, we shall soon discover it. He keeps his hives closed at night, and at all times when it is not proper for them to go out. In this way an even temperature is secured.

Mr. Ely. I have wintered in the dark, in the light, out of doors, and buried. The three swarms I buried, were weighed in the fall, and this spring, when I took them up, I found two swarms weighed eight, and one seven pounds less than before. Of two in the open air, one lost fourteen, and the other twenty-one pounds; those in a cold, light room lost fourteen and a half pounds; my buried bees came out in *fine* condition. The soil was a clay loam, and they were well covered with boards and straw. I took them out March 13th, but it would have been better had I let them remain till April.

Mr. Merriam wintered his bees in a bee house. Those on the north side did best, and there they also made the most honey. They do not go out unless it is sufficiently warm to admit of it.

Mr. Sturtevant wants this question of carbonic acid injuring bees sifted. This gas is very heavy and sinks to the lowest point. Now, I ask Dr. Kirtland how near he brought the candle to his bees?

Dr. Kirtland. I am engaged in fifty problems relating to bee culture, and this winter I put twenty-five of the weakest colonies I had into a dry cellar, also three full and three half-blood Italian swarms. I gave ventilation at the top, but closed the bottom opening. I watched them closely, and found in the bottom of the hive too many dead bees. Placing the candle near the opening, found it nearly extinguished, and I found where the bottom was closed, there was the most carbonic acid and dead bees. Removing the blocks that closed the bottom, this gas did not accumulate, and there I found less injury. Bees breathe, and in their emanations is also found carbonic acid in considerable quantities. I think this a point that has been overlooked in the construction of Langstroth's hive. Where the hive is out-doors, there is less danger from this source.

Mr. Sturtevant. I apprehend there are other things than this gas that injure bees. They must have oxygen, and if placed in a tight hive, soon use up what they have, when they have only nitrogen, carbonic acid, moisture and emanations, and these are as injurious as this gas. My bees, when their hive is open below, have become uneasy when the thermometer reached 40 deg., and have dysentery; this is cured by their having a current of air passing through the hive. Where they had only ventilation at the top, they did not get this condition. His experience is different from that of Dr. Kirtland, and he lost less bees in his hives that were tight at the bottom and open at the top. He admitted that when the oxygen is obstructed, bees cannot live, and in proportion as it is obstructed do they become unhealthy. I use a bee house, and the coldest or north side is the best, both for wintering bees and making honey. One of the most important things in wintering bees, is an equal temperature. On the cold side of the bee house, my bees did not go out at all till the weather became sufficiently warm. When plants furnish pollen for them, they start just as early on one side as the other. Here we have a good deal of S. E. winds during the season for bees to work, and this is very annoying to them. Bees swarm just as early, then, on the north as the south side. I, however, think less of early brood than many do. If you can keep your bees frozen up until April, all the better. January or February brood is not worth talking of. When you bring them out, you want them to go right to work.

Dr. Kirtland. That the air in a bee hive may be contaminated, I have had experience enough to know. I once smothered two colonies of bees on a warm summer day, by closing for a few hours the hives. At least three-fourths of the air in such a hive will be carbonic acid, the rest azote etc. Last fall, I closed up a hive of my best Italian bees for a little time, and lost a large number of the colony. These facts showed to me that great care in ventilation is necessary. I shall not desert my cellar in which to winter bees; I think

the results about the same as those of Mr. Ely, who buried his bees. I am convinced that we can economize honey by keeping them at an equal temperature.

The question, "Which is the best form of hive?" was now taken up.

Mr. Otis. We ought to discard the idea that our barns will take care of the cattle, or our bee hives of our bees. Mr. Langstroth adopted his form after long experience. The shallower and broader we have the frame, the faster we can breed; five inches deep is enough, but if too shallow, bees will not winter well. Within a few years several patent movable frame hives have been invented, differing little from his. Mr. Otis here gave the points of Mr. L's hive which are patented, and stated that many hives are patented, the patented part being of no value. All the *forms* of movable frames sell on the strength of Langstroth's patent. It is wrong to recommend those forms, to the injury of the man who has performed the greatest benefit to the country. He who buys a patent hive should know first whether the useful parts of it are patented. In regard to wintering bees, I believe the best plan is a rick covered with straw and dirt, with holes for upward ventilation, and kept just above the freezing point. I would leave them in this condition till plants furnish pollen for them, if possible.

SECOND DAY—AFTERNOON.

The subject of bee hives was continued:

Dr. Kirtland said that he had only two forms of hives; one Langstroth's, and the other Flanders'. I have expressed no preference for either of them, and have not tested the Flanders' hive, but shall do so as soon as I have an opportunity. I would not give a snap of my finger for most of the fine model patent bee hives which have been presented to the public.

Mr. Otis. The amount of money that will be expended within six months in purchasing hives will be large, and it is important to know which form is best. The decision of this convention will be looked to with interest.

Mr. S. C. Brown said that his experience with the Langstroth hive indicated that it was too shallow. If I make them deeper, however, I cannot remove the frames, on account of the moving of the comb. One objection to the triangular frames is that there is not sufficient room for brood. It is stated that the inclination of the sides facilitates cleaning of the hive, but that is unnecessary, for bees are not sluttish in their habits.

Mr. Otis said he had made great improvement in his colonies, by selecting the most perfect queen cells. Those which are small should never be used. We can improve bees as well as cattle.

Dr. Kirtland said this was no doubt true. He once used a small queen cell to start a colony, but the queen was very weak.

After the discussion, the following resolution was adopted:

Whereas, That at this meeting of the Beekeepers' Association, there were but two forms of movable comb hives exhibited, the Langstroth Movable Comb, and the Flanders' Triangular Self-Cleaning Movable Comb Hives—

Resolved, That the majority of the members of this Association have tested the Langstroth Hive, and are satisfied that it gives the apiarian entire control of his bees, and is worthy of adoption by all beekeepers. That the Flanders Hive has not as yet been tested so as to enable the members to give an opinion of it, based on practice.

It was also Resolved, That this convention recognize the importance of a Bee Journal for apiarians, and that we recommend to beekeepers the "American Bee Journal," published at Philadelphia, Pa., by A. M. Spangler & Co.

At the close of the meeting, Dr. Kirtland read an address on the Italian Bee.

Mr. R. C. Otis gave an interesting account of the copulation of a queen bee. She came out of the hive, circled high up in the air, was absent about thirteen minutes, when she returned. The hive had been closed in her absence, shutting out a drone in front of the hive. When she came back, this drone flew rapidly to her, clasped his legs about her, when an explosion was distinctly heard, and the drone fell dead to the ground, his abdomen being contracted, and the organs of generation recurved over the back.

The Convention adjourned until November 21, 1861, at which time a large number of persons from abroad will doubtless be present.

AMERICAN BEE JOURNAL.

Philadelphia, May, 1861.

TO CORRESPONDENTS.

We have on hand some very interesting communications, queries, &c., which shall be attended to at the earliest opportunity.

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Monthly Management.

MAY.

Alike for the lover of bees and the admirer of nature is the flowery month of May one of the most delightful periods of the year. The colonies are now steadily and rapidly increasing in strength and displaying the most unremitting industry.—Even in the northerly sections of the country, drones generally begin to make their appearance about the middle of this month; and in more favored localities early swarms will issue. The blossoms of the fruit trees furnish abundant supplies, and attract crowds of eager gatherers. The hum of busy hosts resounds from dawn till dusk, and the air is vocal with the music of "toiling millions." But in some districts this is a transient joy, succeeded by inaction and gloom. In these, before the lindens blossom and the white clover comes into flower, there is an interval during which pasturage is scarce. Where this occurs, colonies—especially such as are strong and have much brood—will need regular feeding, to keep them in a prosperous condition. Swarms can there seldom be expected to issue before mid-summer; and if timely feeding has been neglected, the season may pass without favoring us with a natural increase of stock. Where bees are kept on isolated stands, remote from other apiaries, the necessary feeding may be conveniently done in the open air, by offering them supplies of diluted honey in small troughs, shallow dishes, or old drone-comb. But if other bees are kept in the vicinity, or the weather prove unfavorable, this mode of feeding cannot be resorted to without waste and loss. In such case it is better, after the fruit trees have ceased blossoming, to make artificial colonies, and appropriate the needed food to the support of these.

Artificial colonies may be made as soon as sealed drone-brood can be seen in the more populous hives, because drones will then be sufficiently abundant when the young queens have matured and begin to make their hymeneal excursions. If a few of the stronger stocks, especially such as have much drone-comb, be selected and divided early, by drumming out a swarm from each, a large number of supernumerary queens may be procured in the course of from ten to fourteen days, and an excessive production of drones be prevented for that season in such colony. These young queens, or the royal cells containing them, may be used with great advantage in forming artificial colonies.

A fertile queen obtained during the interval of deficient supplies, is still highly valuable, as she is able to produce a large number of workers which mature in season to appropriate the nectar of the lindens and white clover. And in fact, the worth of a weak colony, preserved over winter with much care and difficulty, consists almost entirely in its fertile queen, qualified to furnish a numerous progeny early in the opening season. The advantage of possessing fertile young queens (more to be prized than old ones of previous years,) need hence scarcely be adverted to. Even a feeble colony, having such a queen, may easily be reinforced, and soon become a strong stock if it have access to even moderately rich pasturage later in the season.

Not every young queen that is bred becomes fertile. Many are lost on their hymeneal excursions. Colonies to which such have been given should therefore be watched with peculiar care, till we have ocular proof that they contain worker-brood. If a queen be lost, measures should forthwith be taken to remedy the evil, by introducing a reserve queen or a royal cell. But as these are not always at hand, it is advisable to insert a piece of worker-comb, containing eggs and larvæ, in every colony respecting which doubt is entertained. Those who use movable comb hives can greatly aid their young stocks, and guard against this kind of calamity, by the insertion of combs with uncapped worker-larvæ, at intervals of three or four days, until they are satisfied, by actual observation, that the colony contains a queen qualified to lay worker eggs. The bees will always thus have within reach the means of rearing a queen in case of accident; and at this season the uncapped larvæ is not likely to perish from want of heat or due attendance, unless the colony be very feeble.

SUPERSTITION.

In the rural districts of England, it is said to be a prevalent custom among the peasantry, to put their bees in mourning when a death occurs in a family, by affixing crape to each hive. In some sections a still more solemn ceremony is adopted. After the funeral the whole family proceeds to the apiary, and announces its bereavement to the bees in lugubrious tones—tapping the while three times on each hive with the key of the front door. In other sections this practice extends to informing the bees of every important occurrence which may affect the country. The notion is that, if this were not done, the bees would decamp, or gradually decline and perish.

A box 6½ inches high, and 15 inches square, in the clear, will contain 20 lbs. honey in the comb.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. VI.

We come now to consider that proposition which contains the most peculiar and characteristic feature of the Dzierzon theory; and which, when first announced, was rejected as incredible by intelligent apiarians, and regarded as preposterous and absurd by men eminent in the highest ranks of science.

9. All eggs germinated in the ovary of the queen tend to develop as males; and do develop as such, unless impregnated by the male sperm while passing the mouth of the seminal sac or spermatheca, when descending the oviduct. If they be thus impregnated in their downward passage, (which impregnation the queen can effect or omit at pleasure,) they develop as females.

From time immemorial naturalists have regarded as universally true, the doctrine that no living creature can be developed from the egg of a female, without male impregnation. And when occasionally exceptional cases were adduced, the men of science treated the statements with neglect or contempt, or endeavored to impugn their force or validity by assuming that the observers were either incompetent or careless. But when more recently it was asserted by observers, whose love of truth and skilfulness could not be questioned, that repeated instances had come under their notice where unimpregnated silk-worm eggs had produced larvæ which, passing through the usual metamorphoses, became moths, the necessity of re-investigating the subject could no longer be denied. At the same time, it was announced by other observers and naturalists, that they had witnessed the development of living creatures from unimpregnated eggs of various species of the lower order of animals. Thus, as it were, constrained to the task, the investigation was undertaken by men abundantly qualified by their attainments and skill to conduct it properly.

Though Prof. Leuckart had previously reported an instance of such development, the honor of first making an extended and thorough investigation undoubtedly belongs to Prof. Von Siebold, of Munich. He demonstrated clearly that not only do living larvæ occasionally issue from a portion of the unimpregnated eggs of the silk-worm, and develop as moths—some male, others female; but that in various species of butterflies (*Psyche helix*, *Selenobia triquitella*, and *S. lichenalla*,) the virgin females *regularly* lay eggs which, not partially only and occasionally, but uniformly and without exception, produce females.

Thus Prof. Von Siebold furnished the scientific proof that there are *exceptions* to this alleged universal law of nature; and that cases do occur in which unimpregnated eggs produce living creatures. Prof. Leuckart subsequently noticed a still greater number of exceptions, and says—"there can be no doubt that Parthenogenesis exists far more extensively among insects than is now known or anticipated."

This exception is found also among bees; with this difference however, that among them, *all* the eggs which remain unimpregnated develop as males, and those which are impregnated invariably develop as females, and that the impregnation of the egg determines its feminine sexuality. Consequently, in the case of bees, not only is every egg susceptible of development though unimpregnated, but masculinity *pre-exists* therein, which—marvellous, indeed!—is transformed into feminity by impregnation with the male sperm.

Nevertheless, this doctrine must not be understood as implying that every unimpregnated egg *must*, under all circumstances, become developed as a living male, for many of them may, from various causes, remain unhatched. Hence, if now and then, such an egg does not become developed, the failure is not more singular or striking than that occasionally an impregnated egg remains unhatched. Special causes may produce failure; but whenever an egg is hatched, it will, if unimpregnated, invariably develop as a male; or, if impregnated, it will as invariably develop as a female.

No analogous case has hitherto been observed in the entire range of animated nature, though from some experiments made by Prof. Leuckart, it is not improbable that hornets, wasps and humble bees come under the same category.

Dzierzon originally submitted this doctrine as a *hypothesis*, but did not take any special pains to establish its truth on scientific grounds, though numerous known phenomena in the life-history of the bee would have justified the effort. I advocated it the more strenuously and may claim credit for having been mainly instrumental in securing its final demonstration by Prof. Von Siebold.

I am anxious to attract the special attention of my readers to this portion of the theory, for it is the most important of all the propositions I have undertaken to discuss. With its aid, almost everything relating to bee culture becomes intelligible—without it, hardly anything is clear. He who does not fully comprehend this point will grope in the dark in all his practical operations, and be constantly exposed to mistake and disappointment.

A. To demonstrate this proposition, it is necessary to inquire whether there are any queens which have a spermatheca not filled with male semen, and being consequently unfecundated, yet lay eggs from which living creatures, invariably males, are developed. If this can be proven, the fact will be established that the eggs are by *preformation* masculine, and develop without the influence of male sperm. Such queens certainly do occur. I have myself discovered nearly a dozen. For brevity's sake, I will refer to only a few.

a. In the summer of 1854, the queen of an issuing second swarm, having crippled wings and being unable to fly, fell to the ground in front of her hive. As she was singularly large and beautiful, I concluded to use her for experiment. I returned her to the swarm, which I hived and placed in an isolated spot in my garden, at a distance from every other colony. In four weeks, this colony had drone-brood in worker-cells, which I permitted to come to maturity. I then transferred the queen with a portion of the bees to a glass observing-hive containing an empty comb, and watched till I saw the queen lay eggs. It was necessary that I should *see* this, in order to be sure that the male brood in the cells emanated from eggs laid by this queen, and not from such as were laid by a fertile worker. On dissecting her afterwards, I found her ovaries well supplied with eggs, but her spermatheca contained only a thin, pellucid liquid, without a trace of spermatozoa.

Mr. Vogel, likewise, reports five queens which laid eggs producing drones, and on examination the spermatheca of each was found to contain no male sperm. And, in 1856, Prof. Leuckart dissected a queen, which emerged from her cell with crippled wings and produced drones exclusively. He found no male sperm in her spermatheca.

b. About the middle of September, 1854, long after all the drones had disappeared, I removed the queen of a colony of common bees and let them rear one from a royal-cell transferred from an Italian colony. She made repeated excursions till the 20th of October, and on the 2d of March, 1855, the hive contained drone-brood in about 1500 worker-cells, and about 100 Italian drones had already emerged. I sent this queen living, with a parcel of workers and some drones developed from her eggs, to Prof. Leuckart for dissection. He reported that her spermatheca contained not a trace of spermatozoa, but was filled with a pellucid liquid, such as is found in those of all virgin queens. It may therefore no longer be denied than *an unfecundated queen can lay eggs which are hatchable, but which invariably produce males*—for the testes of the drones sent to Prof. Leuckart were found to have living spermatozoa in their sperm. Mr. Vogel reports the case of a queen, which an investigation by Prof. Leuckart proved to be precisely similar in all these respects.

B. On the 30th of June, 1857, Mr. Kehrhalm sent to Prof. Leuckart a queen which had been fecundated in July, 1854, and proved to be unusually prolific till in the autumn of 1856, laying hundreds of thousands of worker-eggs in that period. But in the spring of 1857 and until she was sent away, she laid drone-eggs exclusively. Prof. Leuckart made a microscopic examination of the contents of her spermatheca, and after the most careful search *could not find a single spermatozoa.*

C. I sent to Dr. Barth, three queens which laid drone-eggs exclusively. He examined them carefully, using the celebrated Leuchtenberg microscope at Eichstädt, but found no spermatheca in either. They must consequently have been *unsusceptible of fecundation.*

D. Eggs occasionally laid by fertile workers will hatch, but invariably develop as males. Workers are unsusceptible of fecundation, as has been demonstrated by Prof. Leuckart and also by Prof. Von Siebold.

E. If eggs required impregnation in order to develop as males, we should undoubtedly find a virgin queen occasionally, some of whose eggs would fail to hatch. But hitherto not a single case of this kind has been discovered, for whenever a virgin queen lays eggs, these, if kept in a brooding temperature, will hatch and develop as males. I concede that it is possible that a virgin queen *might* lay eggs which would not hatch; but I contend that no such case has yet been observed and recorded.

F. How does it happen that we never find a queen that lays *worker*-eggs exclusively? Why can every queen that lays worker-eggs, lay drone-eggs also? And why is it that so many queens are found that lay drone-eggs only? Simply because the eggs of the queen bee are male originally, and require impregnation for development as female.

G. It is an undoubted fact that a fecundated queen can lay a male or a female egg at pleasure. But how could this be explained, if the male egg required impregnation in like manner as the female? It has been alleged that the queen is not able to *determine* the sex of the egg, but only to *discriminate* the sexes when supplying drone or worker-cells—permitting the eggs to issue from one ovary or the other, according to the requirements of the case at the moment of ovipositing. This is manifestly false, for, how in such case could a queen which can only produce drones, lay drone-eggs in worker-cells, knowing, as she must on this supposition, that as male eggs these should be placed in drone-cells. Every colony desires first of all to have workers produced, and the queen intending compliance, designs to impregnate the eggs she lays, but is unable to effect it, either because her spermatheca contains no male semen, or because the spermatozoa therein have become effete, or because she has lost the power of exerting the requisite muscular action.

H. It is a fact that when the fertility of a queen begins to fail, she will lay more or less drone-eggs in worker-cells; and it also not seldom occurs with very prolific queens, that drones will be interspersed among the worker-brood. This, too, would be inexplicable except on the above ground; for the queen obviously designs laying not a drone, but a worker-egg. When the fertility of a queen is failing, she is no longer able to impregnate every egg, because her spermatheca is no longer adequately supplied with spermatozoa. Where a queen, in the full vigor of maturity, occasionally fails to impregnate an egg in the hurry of ovipositing, the egg simply passes the mouth of the spermatheca so rapidly that it does not receive any portion of the spermatozoa, or these are prevented from entering the micropyle of the egg. On the other hand, how does it happen that we *never* find a worker hatched or developed in a drone-cell? Would it not be marvellous that the queen's *mistakes* should all be on one side and tend in one direction?

I. If the male egg does not need impregnation, then pure Italian queens must invariably produce pure Italian drones, and pure common queens must as invariably produce pure common drones, *though each kind were fecundated by drones of the other race.* And such is the ascertained fact. I would, however, not strenuously urge the case of an Italian queen fecundated by a common drone, because we may easily be deceived here, mistaking for one of the pure race, a queen having really a taint of common blood. Common queens fecundated by Italian drones, furnish the clearest and most reliable evidence. Among the drones produced by twenty common queens, in my apiary, fecundated by Italian drones, and producing a more or less mixed worker progeny, there was not one bearing the slightest resemblance to an Italian drone—all being thoroughly of the common race.

K. In May, 1854, I caught and removed a fertile queen of the previous year, intending to use her in forming an artificial colony. When closing the slide of the queen-cage in which I confined her, her abdomen happened to be caught and violently compressed; and on releasing her, the hinder portion seemed paralyzed for some time. After the lapse of an hour, she appeared to have recovered, and I replaced her among the bees. She soon recommenced laying, and laid thousands of eggs with regularity in worker-cells, as she had previously done, but *every one of them produced a drone.* Probably the muscles connected with the mouth of the spermatheca had been injured; or, as Prof. Von Siebold surmised, the spermatheca itself had been ruptured or severed from the oviduct, thus disqualifying the queen for impregnating the eggs.

L. In the summer of 1854, it occurred to me that if the unimpregnated eggs of the queen invariably develop as males, then every queen that is able to lay *both kinds* of eggs, must cease to lay worker-eggs and lay drone-eggs only, if I could succeed in destroying the spermatozoa in her spermatheca without killing or otherwise injuring her. While endeavoring to devise some mode of effecting this, I read in Müller's "*Human Physiology,*" vol. 2,

page 636, that a very high or a very low temperature would destroy the vitality of spermatozoa. I conceived that as heat was the genial element of bees, exposing the queen to a low temperature, yet not so low as to kill her, would effect what I desired to accomplish. Accordingly, in July, 1854, I confined three very fertile queens separately in queen-cages, placed them in an ice-house, and let them remain there thirty-six hours. They were thoroughly chilled—stiff with cold, and white with frost. I removed them, placing them in the rays of the rising sun. They all remained motionless a long time, but at about seven o'clock one of them began to move her limbs slightly. I presented some honey to her proboscis, and in ten or twelve minutes she was completely revived. The other two were irrecoverably dead. I restored the revived queen to her hive, and she afterwards laid thousands of eggs in worker-cells, but all of them, without exception, produced drones. After dissecting her for examination, it was found that the contents of the spermatheca were of a yellowish hue and more liquid than usual. Obviously the spermatozoa had been killed by the cold and were decomposed; and the queen could therefore no longer impregnate the eggs. Dzierzon also records three instances, where queens which had been chilled by exposure to cold, laid drone-eggs only after reviving, though each had previously laid both worker and drone-eggs. A fifth case occurred in the apiary of Mr. Liebe, who sent the queen to Dr. Küchenmeister for microscopic examination. The spermatozoa were found to be motionless and dead.

From these various observations, experiments and facts, I deduce the following conclusion: As it is certain each egg must be impregnated by spermatozoa from the queen's spermatheca, and it is likewise certain, *in the first place*, that queens and fertile workers occur, which though either having no spermatheca or such as contains no spermatozoa, yet lay eggs invariably producing drones only; *secondly*, since queens by compression, exposure to cold, or from other causes, lose the capacity to lay worker-eggs and lay drone-eggs exclusively; *thirdly*, as no queen has yet been found producing eggs which failed to hatch when brooded in a suitable temperature; *fourthly*, as every queen which can produce workers can likewise produce drones, though not a few produce drones exclusively; *fifthly*, since the capacity of normally fertile queens to produce workers or drones at their own option, can only be explained or accounted for on the assumption that the male eggs remain unimpregnated; *sixthly*, since many queens produce drones when obviously designing to produce workers; and *seventhly*, since common queens fecundated by Italian drones produce mixed or hybrid workers indeed, but pure common drones exclusively—it necessarily follows that *all the eggs in the ovaries of the queen are originally and naturally male, and develop as males when laid without having been impregnated; but are changed to female, if impregnated before being laid.*

Such is substantially the position I had reached in 1855. Still the demonstrative scientific proof of its correctness was wanting. It was yet necessary that we should ascertain, by means of the microscope, *first*, whether all the eggs laid by the queen are alike in shape or form, and especially whether the eggs producing the several sexes were all furnished with the micropyle apparatus; and *secondly*, whether spermatozoa are found on the micropyle or in the interior of recently laid female eggs, and are wanting on or in male eggs. Providentially, two of the most competent and skilful living naturalists, Prof. C. T. Von Siebold, of Munich, and Prof. R. Leuckart, of Giessen, took a lively interest in my investigations. Both visited me at Seebach, and used their microscopes for a minute examination of the material which my apiaries placed at their disposal.

Prof. Leuckart, who was the first to visit me, was only able to determine that the male as well as the female eggs were furnished with the micropyle apparatus, and were precisely alike in shape or form; but he did not conclusively ascertain the second point of the inquiry, for he succeeded only in detecting spermatozoa on the micropyle of two worker-eggs. Having restricted himself to searching for spermatozoa only on the *exterior* of the eggs, he failed to obtain any decisive result. In the case of bee's eggs, the spermatozoa are not constrained, like those of other insects generally, to force a passage through a dense albuminous stratum before reaching the chorion; but are deposited almost directly on the micropyle apparatus, and can enter the micropyle with little delay or difficulty.

Prof. Von Siebold, who honored me with a visit in August, 1855, was more fortunate. He was able not only to substantiate Prof. Leuckart's observations, but to demonstrate the presence of spermatozoa in female eggs and their absence in male eggs—thus solving this interesting problem scientifically, and forever settling the question.

Prof. Von Siebold was mainly indebted for his success to a novel mode of preparing the eggs for examination, which occurred to him after numerous failures in his efforts to prepare them in the ordinary manner. He crushed them slowly and gently by means of a thin plate of glass, in such a

manner as to rupture them at the lower end or pole, opposite to that on which the micropyle is situated, thus causing the yolk to issue below, leaving a transparent vacant space above, between the chorion and the receding yolk. He directed his attention specially to this vacant space which he thus saw gradually forming under his microscope, as the yolk of the egg was passing out of the ruptured envelopes; and in each of thirty, out of forty, of his prepared female eggs, he found from one to five spermatozoa. In three of these eggs the spermatozoa were still active. On the other hand, on examining twenty-four successfully prepared male eggs, he could not discover a single spermatozoa either on their exterior or in their interior. So late in the season we could not procure a larger number of drone-eggs; but those used were of the same age with a portion of the worker-eggs, and were laid by the same queen. Prof. Von Siebold, in his treatise on "*Parthenogenesis in Bees and Butterflies*," gives a detailed report of this discovery, so startling to all physiologists and so subversive of the hitherto received doctrine of animal re-production.

Prof. Leuckart subsequently investigated the matter anew, and fully corroborated Prof. Von Siebold's observations, having frequently discovered spermatozoa in female eggs, but never found any in male eggs.

At the close of this important article, I will merely add that if unimpregnated eggs did not develop as males, and impregnated ones as females, "*the entire complicated economy of the commonwealth of bees, as arranged and ordained by the Creator, could not permanently subsist.*" Such is the expressive declaration of Prof. Von Siebold, on reviewing the case in all its connections and bearings.

☞The only reliable means of preventing the absconding of a swarm, besides the forming of artificial colonies, is found in drumming out the first and the second swarms at the proper period. To prevent a natural swarm from decamping after being hived, place it in a cool room or a dry cellar for twenty-four hours, supplying it plentifully with honey. The bees will commence building comb, and their swarming fever being cooled off, they will remain contented, when afterwards brought out and placed on their stand. Second swarms may be prevented, by destroying all the royal cells, if they are accessible, as they are in movable frame hives. If after a swarm is hived, the bees are heard nibbling at the inner surface of the top, we may safely conclude that they intend to make their new domicile their permanent abode.

[For the "Bee Journal."]

In answer to an inquiry on page 77 of the "Bee Journal," you say, "The dysentery and consequent mortality, in the above case, were probably caused by the want of sufficient *upward ventilation* in the hives used." I am inclined to think that we shall have to look a little farther in our investigations for the true cause. I wintered my Bees in a very dry cellar. About half of them being in the movable comb hives, I removed the honey board entirely, the others being in box hives with from two to four holes in the top; all the hives being raised a little from the bottom. The result was, all except two proved very unhealthy; so much so that I lost seven swarms out of twenty-six. The two healthy swarms were in box hives with two 1¼ inch holes in the top. All the swarms which died were in the frames. The bees in the frame hives discharged their fæces mostly on the top of the frames and upper edges of the combs, those in the box hives came out of the holes in the top and emptied themselves around the holes, and their combs appear cleaner than those in the frames. Now, instead of thinking ventilation or no ventilation the cause of this difference in healthiness, I am inclined to go farther back, and see if the true cause may not be in the honey which they feed on. I shall not be able to answer this question myself; but I wish to institute inquiry, and to this end will make the following suggestions. *First*, two successive dry seasons, (that is here) and an almost entire failure of flowers to yield honey. *Second*, bees did not seal their honey for many weeks after it was stored. This second suggestion is worthy of attention; in a wet season, when we might suppose bees would get more or less water with their honey, it would not appear to be so strange, that they should leave it unsealed for the water to evaporate. Probably the most of the honey obtained *here* after white clover failed, was from wild flowers. Although I sowed five acres of buckwheat early and it was in blossom a long time, I could not at any time find only a few cells of buckwheat honey. So scanty was the honey harvest, that of nearly fifty new swarms in my neighborhood I do not know of one that has wintered.

As a farther help towards a solution of the second query, if beekeepers who have large hives that might have contained old honey, would communicate their observations on this point, through the "Bee Journal," we might perhaps, after a while, arrive at some definite conclusion. J. F. L.

Marengo, Ill.

☞Please send us the names of beekeepers.

BEE ITEMS FROM MAINE.

Ed. Am. Bee Journal:—It was amusing to read the notices of the "Bee Journal" when it was first started. Some papers, though speaking very highly of it, thought that it would take but a few numbers to contain all that is known or that is necessary to know about bees for their successful keeping, and then its mission would be accomplished.

Without doubt you and the publishers will be content, if it can have a generous support till then, to stop it with a spicy valedictory when this knowledge shall be possessed by the masses; but, till then, there seems to be an extensive field unoccupied by any other journal among us, which ought to have a possessor,

The past winter—1860–61—has been one of the severest for bee culturists known for a long series of years. Stocks, with ample stores, have died in-doors and out-doors, with, as far as I can judge, but little difference.

Many who have been among the "lucky ones" for years, with bees, have been as heavy losers as any, and yet can not, only by guessing, tell the cause of such loss among bees as has been this past winter.

Here, in lat. 44° 46′ N., altitude 560 feet, saw the drone bee first out, only a few, May 5th, and at that time, not very warm, but pleasant. None of the Italian bees in this section of the State, as yet, that I am aware of, and as there are no extensive apiarians, doubtful if any are introduced this season, at the present advertised prices.

On page 112, Bee Journal, it is stated that bees will gather honey from different flowers on the same excursion, promiscuously, but when collecting pollen confine themselves to one species of plants or flowers.

The *American Bee Keeper's Manual*, p. 81, says they collect honey from one specie at a time *only;* that is, a division collects from one kind of tree blossoms and another division collects from another, and so on, without ever changing from one species to another, or from tree blossoms to any other flower on the same excursion.

How is this? O. W. True.

Elm Tree Farm.

☞A drone-breeding colony is generally very unwilling to accept even a fertile queen when introduced in the hive, and speedily destroys a sealed royal cell if inserted. Mr. Kaden says this perverseness and obstinacy may easily be overcome, if the sealed drone-brood be destroyed, by passing a sharp knife through it; a fertile queen then offered will be kindly received.

GREAT YIELD OF HONEY.

Mr. Hamilton writes thus to the "*Sacramento Union*," from Stockton, under date of January 14th, 1861:

"Thirty-five swarms of bees did produce, during the past season, over twenty thousand pounds of honey. I am not surprised that the truth of this should be questioned, for I doubt if the world can furnish a parallel. Not that a hive producing 571 pounds, in one season, cannot be found; but that thirty-five swarms should average that amount is a great yield. But it is of no good to the public to be told that a great thing was done, unless they are informed how it was done. This I will try to do in as few words as possible.

"About the 1st of February, 1860, I left Stockton with thirty-five swarms of bees—25 swarms in Langstroth's hives, containing about 1400 cubic inches—and 10 swarms in another movable comb hive, containing about 2000 cubic inches each. I took these bees to the town of Santa Clara, Santa Clara County, and kept them there until the 1st of July, six months. I managed them on the system taught by the Rev. L. L. Langstroth, in his work on the honey bee. I fed them on nothing except the honey that I took from them. By the 1st of July the swarms had increased to 270. I removed them at that time to the vicinity of Stockton, whence they started; and by the 1st of October the swarms had increased to 500. The large hives, 10 in number, have increased to 75; containing 60 pounds of honey each, or 4500 pounds. The small hives, 25 in number, have amounted to 425, containing about 35 pounds each, or 14,875 pounds. From the small hives, in September, about 700 pounds were taken, and they afterwards filled 700 pounds; making for the whole the great total of 20,075 pounds. From the above it will be seen that the small hives have been much the most profitable. Bees do very little in Santa Clara, after the 1st of July; but in San Joaquin and Sacramento Valleys, they do the most after the 1st of July,—July, August, September and October being the best months of the year."

☞Prof. Leuckart has recently expressed the opinion that, for the production of wax, pollen is of rather more significance than honey. The latter, or its equivalent, is of course always indispensable, and the former may at times, for a brief space be dispensed with. But for the rapid and abundant production of wax both are required, and the Professor thinks that then pollen is much more extensively used in the process than is generally supposed.

☞Please send us the names of beekeepers.

Hermaphrodite Bees.

We translate from the Bienenzeitung, Dr. Dönhoff's account of the hermaphrodite bees, to which reference was made in our last number.

"On the 6th of July I received a bee, with the following note accompanying it:

'I send you herewith a bee, which I regard as half drone and half worker. The head appears to be exactly like that of a worker, and the abdomen like that of a drone. I take it to be a *monster*. But how does this apparent combination of the sexes correspond with the theory of fecundation? If the creature is what it appears to be, it may possess some interest in a scientific aspect, though of no account in practical bee culture.

Ohlau, July 3d, 1860. WALTER.'

I have examined this singular specimen very minutely, and the following is the result of my observations:

1. The head and the thorax with its appurtenant organs, differ in no respect, whether in size, shape, color or hirsuties, from those of a worker bee, and have no resemblance to those of a drone. On a most careful comparison with a worker, I could not detect the slightest difference in the parts referred to. In shape, the compound eyes are precisely like those of the worker, having on the forehead an intervening space decorated with a tuft of hair; and containing the three simple eyes, which in the drone are situated more fully in front and just below the junction of the compound eyes on the forehead. The proboscis has the length of that of the worker. The hinder legs have the corbicula characteristic of the worker. The *tibia* and tarsus are fringed with a seam of hair, which is wanting in the drone.

2. The abdomen has exactly the appearance of that of a small drone. It is somewhat larger, broader, and more obtusely terminated than that of a worker. The first two dorsal segments are slightly hirsute; the last two have the hairy tufts characteristic of the drone; and the lower margin of each segment has the characteristic sharply-defined brighter edging. The ventral segments are more hirsute, and the edging is broader than in the workers, and precisely similar to what we see in drones. The rear abdominal ring terminates in an obtuse brown point, characteristic of the drone. The wax-secreting membranes, characteristic of the worker were entirely wanting, and instead thereof, the upper section of the abdominal rings has a black margin.

I dissected the abdomen with the utmost care. The sting and its appendages were wholly wanting —being replaced by the male sexual organs. I may add, for the benefit of doubters, that the thorax and abdomen were united organically, just as those parts are united in common bees; and that artistic skill could not have effected such a junction for the purpose of deception. Unquestionably I had before me a most remarkable creature, *the anterior portion of its body being that of a worker, and the posterior portion that of a drone.*

There are two ways in which this singular combination of the sexes may be explained:

1. It is possible that the egg which produced this creature contained two yolks, one of which was impregnated by drone semen, and the other not. In the yolk of the latter a drone, and in that of the former a worker, was developed. These gradually coalesced, and were finally blended into one.

2. According to the Dzierzon theory of the origin of drones from unimpregnated eggs, the process of development in this particular case may be more easily explained. The egg contains the male individual *in potentia*, and the spermatozoid the female *in potentia*. The development of all animals depends on the intimate union of the germ of the egg with the germ of the spermatozoid. In the development of the worker, the spermatozoidal germ predominates; hence, in consequence of fecundation the female is developed. In the case under consideration both were developed, yet so imperfectly that the germ of the spermatozoid produced the head and thorax, while the germ of the egg produced the abdomen.

But, let the development have been caused or determined as it may, this discovery is one of the most interesting ever made in pathological anatomy or in bee culture. It is, in fact, the most singular instance of animal monstrosity that has come to my knowledge. It would have been additionally satisfactory to know what were the instincts or propensities of this bee while living —whether it was prone to gather honey and pollen, or whether like drones it was a mere consumer and left its hive only during the warmer hours of the day."—*Orsoy, July 7.*

"Yesterday there was sent to me another such bee, with the following note:

'Judging from the tenor of your article in the Bienenzeitung, No. 15, 1860, it would seem that such abnormal creatures as there described are thought to be of rare occurrence among bees. It is, however, by no means so. I venture to say that if all beekeepers were careful observers, some similar specimens would be discovered yearly in any extensive apiary. They are usually found

dead in front of the hives, just before the close of the swarming season—perhaps because more attention is then paid to the bees, or possibly because the queens have then reached a particular stage in egg-laying, when only such vagueness in the propagation of the sexes can occur.'

'The instances of amalgamation which I have most frequently noticed, and which it would seem nature can most easily produce or permit, are like that which you have described. Nevertheless, specimens are sometimes found which might lead one to imagine that nature was totally at fault in their origination, since it is impossible to determine with precision where the worker begins or the drone ends in them. In the one I send you, you will find this remarkably exemplified. I leave it for you to furnish a particular description of the creature, should you deem it of sufficient importance to engage your attention. Meanwhile I consider it a duty to communicate the circumstances under which I discovered it, and what I observed while it was still living.'

'On the 11th of August, I drummed out a drone-breeding colony, the remains of an old stock from which a swarm had been previously forced. There were only about 300 bees remaining, and while examining these in the hope of detecting the drone-mother or unfecundated queen, I noticed a small drone exhibiting singular movements and unusual agility. I caught it, and on close inspection of its ventral side, I fancied for a moment that I had got hold of the wrong insect, as what I held in my hand seemed to be a regularly formed worker. But a second glance convinced me that I had possession of an abnormal creature, manifestly worker on its ventral and drone on its dorsal side. On repeatedly returning it to its companions, it exhibited the same actions and joyful fanning which workers display in such case. Her companions manifested no special interest in her, and bees of other colonies treated her with indifference.'

'Her sting produced the same effect as that of other bees; but unfortunately it remained fixed in my skin. It seemed to be rather smaller than bee's stings usually are. You will find it inserted, point foremost, between the last two abdominal rings. That the circumstances here stated and the observations made, are correctly detailed, and that the accompanying sting was organically connected with this drone-worker, can easily, if required, be established by satisfactory testimony.

Polchow, near Stettin. WITTENHAGEN.'
August 14, 1860.

"To this highly interesting communication, I subjoin a description of the bee, premising that for more accurate comparison, I placed the hermaphrodite between a worker and a drone on my table.

1. The head differs in no respect from that of a drone. The antennæ do not form a straight line, like those of a drone, but are curved outward; and the joints are clearly defined and prominent. The compound eyes are large and meet above like those of the drone; the simple eyes are placed in the front, on the brow or face; and the proboscis is short.

2. The thorax differs in nothing from the thorax of a worker. The legs are shaped like those of a worker, and the hinder two are provided with corbicula.

3. The abdomen has the characteristics of worker and drone blended. The dorsal segments have the hirsuties and colored margents of the drone. The ventral segments resemble those of the worker. Between several of the rings, thick scales of wax were found. The anal orifice is situated at the rear termination of the longitudinal axis of the body. The brown point of the last abdominal ring, as seen in drones, was wanting. As I design preserving this insect, I did not dissect it. From the presence of the waxen scales, sting, &c., we may infer the absence of male sexual organs. What is remarkable in this creature is that the head is the head of a drone, and its instincts (judging from its *fanning*) were those of a worker. This also suggests two conjectures—either the source of the instincts or impulses is not seated in the brain, or the head is only externally the head of a drone, while internally the brain is that of a worker!

I requested Mr. Walter to give me an account of his discovery of the hermaphrodite which he sent for examination. He writes as follows:—

'I found it between 8 and 9 o'clock in the morning, crawling about on the grass in front of my apiary. It had obviously just emerged from its cell, and had either voluntarily left its hive, or been expelled as a useless member of the community. Desiring to preserve it alive, I offered it honey; but it refused to eat, and seemed intent only on running about incessantly. I could not ascertain from which colony it issued, as my hives were then ranged pretty close to each other.'

Whether this bee was consciously diseased, or whether it was expelled from the hive, cannot now be known. The one found by Mr. Wittenhagen was in health and in the full exercise of vital functions, as is evident from the secretion of wax and from the *fanning* in which it engaged—which are of themselves indications that it might have attained the usual age of a worker.

Orsoy, Aug. 21, 1860. DÖNHOFF."

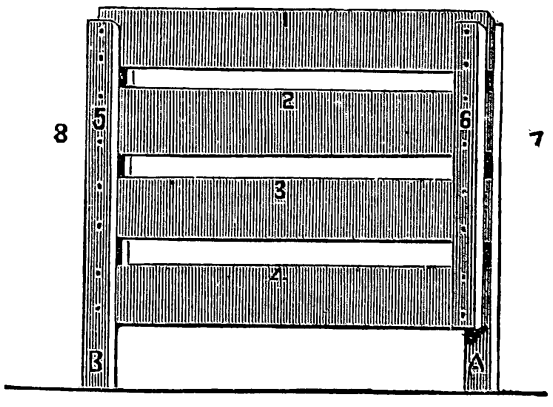
(For the "Bee Journal.")

Improved Colvin Guide Frames.

To avail ourselves fully of the movable comb principle, the bees must be compelled to build all their combs not only straight, but of uniform thickness. Every comb will then fit, without trimming, any where in any hive. For more than ten years I have kept this point steadily in view, and after numerous experiments, have become satisfied that bees, if left to themselves, will never construct their combs in the way desired. Even if they make them of uniform thickness, they will wave them more or less to give them greater strength, just as iron is corrugated for the same purpose.

I shall now give a description of a device which I invented some months after Mr. Colvin's, and which, if he should patent his invention, can only be used with his permission. My guides were tried last year with considerable success; and the mode of making them was so improved by the Rev. L. Wheaton, of North Falmouth, (Mass.) that he met with uniform success. I have still further improved and simplified their construction, retaining Mr. Colvin's original principle, but adding to it two very important features, viz: that these guide frames regulate the distance between the comb-frames, and hold them firmly together and "out of wind."

The annexed is a perspective view of one of these guides, and the dimensions are intended to suit the size of hive and comb-frames given in the third edition of my work on the Hive and Honey Bee.*



1, 2, 3, and 4 are slats, each 17⅜ inches long, by 1¾ inches wide, and ⅛ inch thick. 5 and 7 are each 9¼ inches long, by 1¾ inches wide, and ⅛ inch thick. 6 and 8 are each 7⅜ inches long, by ½ inch wide and ¼ inch thick. In nailing, the slats are put between 5 and 7, and 6 and 8, the bottom slat coming flush with the lower ends of 6 and 8, and the top slat projecting ⅜ inch above the top ends of the uprights 5, 7 and 6, 8. The spaces between the slats are each ⅜ inch wide.

Thin nails (cigar-box nails are best) ¾ inch long, are driven as shown in the cut, so as to fasten the slats between the uprights, and slightly clinched by nailing upon an iron surface. The lower ends of 5 and 7 (A and B) extend below the ends of 6 and 8, and form legs which rest on the bottom board of the hive. These legs are on opposite sides of the guide-frame, so as not to interfere with the bradding of the comb-frames as described in the last No. of the Bee Journal.†

Mode of using them: Put the first comb-frame ¼ inch from the farther side of the hive, crowding a wad of paper or cotton between the top of the frame—where it rests on the rabbett—and the side of the hive to keep the frame in place. Now put in, as close as possible, a guide frame; then another comb-frame, &c., until the hive has nine comb and nine guide frames. The last guide-frame may be slightly bradded to the last comb-frame, so that the two can be lifted out together. It will be well to put one frame with brood into the hive (see page 115 of my work), before hiving a swarm, as the bees are more liable to desert such a hive, not knowing that their owner intends to remove the partitions between their combs. The mode of removing the guides is the same as that described in the April No. of the Bee Journal.

It may be asked—Can we interfere so much with the bees, and yet not diminish the amount of comb built or honey gathered? This question can be more satisfactorily answered, after the guides have been tried, by many observers, under the varying circumstances of different seasons and locations. Enough, however, has been done to make complete success highly probable; and if the final result justifies our expectations, the Improved Colvin Guide Frames will be second in importance only to the movable comb principle.

L. L. Langstroth.

Oxford, Ohio.

*In some copies of that edition the top of the frames is given 1⅛ inch wide. It ought to be one inch.

†In that description, as well as this, the hive is supposed to be placed before the reader, with the portico on his left hand and the leg B of the guide comb on his left hand also. Nine guide-frames form a set, and where a number are made with proper facilities, a set need not cost over 25 cents, and can be used year after year.

☞If not prevented by change of weather or other cause, the first hymeneal excursion of a young queen will be made on the same day on which the swarm is hived. But ordinarily it takes place on the following day, between noon and 3 P. M., rarely later, and still more rarely in the forenoon.

[From the "Bienenzeitung."]

Change of Queens.

That bees not unfrequently change their queens. deposing and expelling or destroying the old ones and rearing young ones in their stead, will hardly be questioned by any experienced apiarian. Colonies, subsisting twenty or even thirty years in a flourishing condition, are indeed occasionally met with; but certainly no queen could survive during so long a period, and continue vigorous and prolific all the time. Careful observation has established the fact that bees are short-lived creatures; and where a stock is maintained during a succession of years, repeated changes of queens must obviously take place. Such changes appear, however, to occur much more frequently, or at shorter intervals among Italian bees than among the common kind. I will relate my last summer's experience.

I wintered thirty-six colonies in 1859–60. About the half of these, to my certain knowledge, contained one and two year old queens; and the queen of one colony was a drone-egg layer, reared late in November. All of them passed the winter safely; but in March some began to discard their queens, and the destruction was not restricted to the older, but extended indiscriminately to the one and two year olds also. This game was repeated in April, May and June, and involved the loss of twelve queens. Three or four colonies perished in consequence, and among them the one having the drone-egg laying queen. One queen died from superannuation and exhaustion. Thus one-third of my stocks were so weakened and reduced, as to be unable to avail themselves properly of the spring and summer pasturage—failing not only to furnish any surplus stores, but some of them actually requiring to be fed in autumn. If fall pasturage had been abundant the case would doubtless, in this respect, have been different; but in my neighborhood there is usually little to be gathered after the rye-harvest, and the continual wet weather last spring and summer interfered greatly with the earlier supplies. This frequent changing of queens, which Dzierzon regards with favor, is consequently a trait in the Italian bees which does not specially recommend them to me, in my locality, however advantageous it may, on many accounts be, in districts where late summer and fall pasturage abounds, and the apiarian has numerous colonies, and like Dzierzon has on hand a constant supply of reserve queens, in nuclei and small hives, ready for emergencies as they arise.

Nevertheless, I shall continue to cultivate this beautiful, industrious, and good-tempered race, ever striving to maintain it in its purity, difficult as it is to accomplish that in a place where common drones still abound. Yet, according to my experience, success is attainable even there—especially if queens be reared in the latter part of summer and early in the fall, when common drones have very generally disappeared. If proper means be taken to preserve Italian drones till such period, little difficulty will be encountered. Late in the season, queens will not fly so far from their hives, when making their hymeneal excursions, as they do in the warm days of summer; and are consequently more certain of meeting with drones pertaining to their own apiary. O. Rothe.

Altschau, Nov. 21, 1860.

YOUNG QUEENS.

The proceedings of a young queen are singular. After leaving her royal cell, the first effort of a newly hatched queen is, by *teeting* or *piping*, to incite the workers to destroy all the embryo rivals which other royal cells may contain. Not till this is accomplished does she make her hymeneal excursions. But if the weather is remarkably fine, pasturage abundant, and much vacant room in the hive, it occasionally occurs that the zeal for honey-gathering overpowers the swarming propensity of the workers, and some of the embryo queens are permitted to mature. The first emerged queen will then fly out to meet the drones, and drone brood will be carefully fostered. Such cases, however, are rare—though they serve to establish the rule that young queens will not make their excursions till all rivals are disposed of. The same thing takes place, if a virgin queen confined to a cage be suspended in a hive containing one just emerged from her cell. The latter will not leave the hive, though at liberty to do so, till her fancied rival is removed. A different result sometimes occurs when a strong second swarm, which happens to be accompanied by two queens, is placed in a large oblong hive. Here the swarm may divide into two parts, each retaining a queen, and the one take up its abode in the front, and the other in the rear part of the hive. Each of these queens, thus situated, will issue, and if fecundated, commence laying. The singularity in such case is that the queen and workers of each portion will make peaceable use of one common entrance.

☞Young queens do not usually make their hymeneal excursions till the eighth day after leaving their cells; sometimes, though seldom, on the fifth day; and early in the spring commonly not till the tenth or twelfth day. Very small queens, or such as were bred in unusually small cells, are still more dilatory.

Dysentery.

Dysentery in bees is a profuse involuntary discharge of fæcal matter, within the hive, resulting from inability to retain the accumulations in the intestines and rectum for a prolonged period, when confined by stress of weather in the winter and spring. It is not in itself a disease, arising from inflammation of the mucous membrane of the intestines; for if relieved by a seasonable change of weather, which enables the bees to fly and void their excrement, all unfavorable symptoms at once disappear, and the colony remains healthy. But continued confinement after the involuntary discharges have taken place, and prolonged exposure to the foul air thus generated, debilitate the bees and cause the mortality which so rapidly depopulates the hive.

The length of time during which bees can bear confinement without inconvenience, depends greatly on circumstances. They may endure it for ten or twelve weeks wholly uninjured, or they may be ruinously affected, if shut in only a few days—according to the nature of their food and amount consumed, the dry or damp state of the air they respire, or the degree of cold to which they are exposed. When they have access to pure uncandied honey, breathe an uncontaminated air, and are kept quiet in a uniform moderate temperature, the consumption of food and consequent accumulation of excrement will be small, and prolonged confinement will not incommode them. But when the honey they consume in the winter is thin and watery, or was gathered from evergreens, late honeydews, or exclusively from heath flowers, and has remained unsealed in the cells, the consumption will be inordinately greater, the accumulation of excrement more rapid, and its retention more difficult. So also, where the colony is subjected to frequent disturbance, rousing and exciting the bees; or where the changes of temperature are frequent and great, or the general temperature in which they are kept is very high or very low, similar consequences ensue—especially if there be a superabundance of moisture in the hive. So far as it is in his power, the apiarian should guard against these conditions.

Exposure to cold and hunger will be followed by dysentery; and if immediately after gorging themselves with honey, bees be placed in a temperature of from 50° to 55°, they will certainly be subject to dysentery within twenty-four hours. It is difficult to say whether this results from an affection of the intestinal canal, or whether the instinct of the bees has simply been put at fault, permitting involuntary evacuations. Dysentery rarely occurs, except in feeble colonies and hives affording slight protection from cold—partially, perhaps, from the greater quantity of honey consumed, for the purpose of generating animal heat. While this object is imperfectly attained, rapid digestion overloads the intestines with fæcal matter, and causes a general relaxation of the system.

It has been supposed that from atmospheric causes dysentery sometimes assumes an epidemic character, affecting the apiaries in a wide range of country. Such was the case in Lusatia in 1840, when more than three-fifths of all the colonies there were destroyed. Dr Jähne thought the consumption of unsealed honey gathered, late in the fall, from the heath flowers (*Erica vulgaries*), was the originating cause. Ehrenfels records the destruction of an entire apiary, consisting of more than 300 colonies, by dysentery, resulting from the consumption of an unsealed viscid honey gathered from pine and fir trees. This contained only a small proportion of saccharine matter in a large mass of crude and indigestible substance. It was tough, clammy, and resinous, and could be drawn out in long threads. Two years ago Dzierzon lost a considerable number of bees, in colonies which had stored up this description of honey. Late gathered honey-dew is injurious, for similar reasons. It contains comparatively little nutriment, generally remains unsealed in the cells, undergoes partial fermentation, and becomes acid. It produces no injury if consumed when the bees can fly freely, because they are then able to evacuate their excrement; but confinement while they are restricted to such diet, proves disastrous.

The disease called *May sickness*, is not dysentery, but constipation; though it also results, in some cases, from the consumption of bad honey. Fæcal matter accumulates in the intestines and rectum, accompanied by an inability to evacuate, resulting from the sluggish condition of the viscera. Brooding bees appear to be particularly liable to this disease. We find them leaving their hives and crawling about on the ground, unable to fly, and with the abdomen inordinately distended. It rarely happens that any considerable number are thus affected at one time, though some are found every season, in colonies which are populous and have much brood. It is thought to be caused among the brooding bees, or nurses, by excessive consumption of honey and pollen, and prolonged though voluntary confinement.

Various remedies for dysentery have been proposed, but none of the medicaments recommended seem calculated to be of service. If the excrement of bees suffering from this malady be chemically analyzed it will be found precisely similar in com-

position to that of healthy bees, though rather more liquid. Feeding with buckwheat honey, which has been largely relied on as a cure, can scarcely have any other effect than that of inciting the bees to fly, as does similar feeding with diluted honey or sugar-water. If the weather permits them to follow the impulse, and thus affords them an opportunity to void their excrement seasonably, the affection disappears—or, as it is termed, the disease is *cured.*

On the whole, it would seem that the *avoidance of extremes* is the most effectual mode of guarding against the malady. Too much or too little food, too much or too little heat, too much or too little moisture, and too much confinement, are all alike injurious. In this, as in most other things, *the golden mean* is to be observed. Mr. Hanneman, of Brazil, says that his bees never suffer from dysentery, or rather that the disease never makes its appearance among them; because in that country, or at least in the favored region where he resides, there is scarcely a day in the year when the weather prevents them from flying.

[For the "American Bee Journal."]

Messrs. Editors of Bee Journal:—In answer to G. T., I would say, do not use any smoke, before or after opening a hive. First loosen the honey board carefully, then sprinkle the bees and frames with sweetened water. He can then handle them without a bee-hat; although, if he is timid, by wearing one he will soon get over it.

Any one after using the sweetened sprinkle, will never use smoke about a Langstroth hive again—although it was recommended in the last "Rural New Yorker."

Bees in the city have not got any pollen up to this date. Three miles south of this, they worked the first on the 13th of this month, but have done nothing since; and the way it is now snowing they will do nothing this week.

H. C. Spencer.

Oshkosh, Wis., April 17, 1861.

☞When a colony perishes of starvation in summer or in the fall, the workers first become too feeble to fly, and then too weak to walk, their motions being tottering and slow, till finally they die. If bees exhibit such symptoms in winter, they are not really dead immediately after becoming motionless, and may generally be restored, if found soon after getting into this condition and removed to a warm room. If their hive contain sufficient supplies of sealed honey, or they be transferred into one which is thus furnished, they may then still survive the winter.

The Bee.

Never has there been a creature, unless it be perhaps the sweet-toned nightingale, that has lent inspiration to the poet's muse more frequently than the little honey bee. And wherefor has she received such tributes of praise? Let us answer in the words of one of her admirers:

"Not a flower can be found in the fields,
Or a spot that we till for our pleasure,
From the largest to least, but it yields
The bee, never wearied, a treasure.

Scarce any she quits unexplored,
With a diligence truly exact;
Yet, steal what she may for her hoard,
Leaves evidence none of the fact.

Her lucrative task she pursues,
And pilfers with so much address,
That none of their odor they lose,
Nor charm by their beauty the less.

Not thus inoffensively preys
The canker-worm, in-dwelling foe!
His voracity not thus allays
The sparrow, the finch, or the crow.

The worm, more expensively fed,
The pride of the garden devours;
And birds pick the seed from the bed,
Still less to be spared than the flowers.

But she, with such delicate skill,
Her pillage so fits for our use,
That the chemist in vain with his still
Would labor the like to produce.

Then grudge not her temperate meals,
Nor a benefit blame as a theft,
Since, stole she not all that she steals,
Neither honey nor wax would be left."

Cowper.

Poets are often apt to exaggerate, but in the case of the bee we cannot lay this fault to their charge. There can be no doubt that this insect is, in every respect, one of the most interesting of all living creatures; and as the little denizen of the hive is the companion of man, and renders him essential service, it is but natural that it should receive a large share of his attention. This too must be *our* excuse for endeavoring to give fresh interest to the story that has already been narrated by so many able writers.—

Samuelson.

Mr. Kritz estimated that in a hive containing combs with 50,000 cells, 30,000 are appropriated for storing honey and pollen, and 20,000 for brood,

[For the "American Bee Journal."]

Bee Chambers.

There is no difficulty in making bees attach to the inside wall of a house. Have a box of a small convenient size, dressed smooth outside, rough inside; one side to slide, with a peg at each edge to hold it in place. This piece should be dressed smooth inside, to prevent the bees from attaching to it. When your bees swarm, put them in this box as you would in an ordinary hive. At night convey them to the house; turn the mouth of your box up, and confine it to the plate of the house, placing the side with the slide next to the wall. Draw out the pegs and let the slide down carefully, so that your bees can attach to the wall and plate. Have appropriate holes in the wall (from which side the slide has been removed,) for the bees to pass in and out. Keep this box there three or four days, until your bees get fairly at work. Then, at night, let it down two or three inches; and in a few nights more you may remove it entirely. If your house is dark they will work through the holes; if much open they will fly to the light.

Have your bee house of any size to suit your fancy. My first bee house in Selma, which has been in successful operation more than twenty years, is ten by twelve feet square and eight feet high over my dairy. The weather boards were put on after the manner of scaling, planed outside, inside rough. The bees are attached to the wall between the studs. They have worked down from the plate to within six inches of the floor, where they stop for the trash to fall, which is swept out once or twice a year, without further attention. No moth has disturbed them; and one colony has remained the whole time, as experiment, without taking away the comb. My present house, at the place where I now live, is fifteen feet square, eight feet high from plate to sill. This is made of upright planks with slats over the cracks outside. Between these slats are three 3¼ inch auger holes, first eighteen inches below the plate and at each eighteen inches down; all stopped, except the top, until they build down to them.—In this house, instead of studs to divide the families, are extended upright planks sixteen inches wide, to correspond with the plate, from plate to sill. After one swarm is attached, you may add to it as many more as you please, by turning the mouth of your hiving box up under the others, and knocking it gently, or smoking if they dont move. This may be done at any time, though I prefer night. Then by morning they are all quiet and at work. Bees are very partial to a house, and from it they never swarm; nor has there ever a swarm left my house, after they are put in.—You may send this to the new Bee Journal, to which I shall take pleasure in contributing some of my experiments, with my views of the origin and prevention of the bee moth, in either house or box, with as much certainty as you propagate the bee.

EDWARD GANTT.

Sylacauga, Alabama, April 24, 1861.

☞ It was customary, we believe, in some sections of Ohio, about "sixty years since," for the early settlers when erecting dwelling houses, to fit up a small room or chamber in the garret for the accommodation of bees, into which stocks were placed, alike for shelter and convenience. This arrangement appeared to be satisfactory both to the insects and their proprietors; and success induced various modifications and extensions of the plan—including fixtures for the attachment and support of combs built exterior to the original hive. Bees worked very well in such quarters; and probably some bee houses of this description may still be found in that and other Western States. But the irruption of the worse than Vandal moth, which took place about the year 1810, was followed by the gradual abandonment of this as well as most other modes of bee culture. The plan might be adopted with advantage for family purposes, if the ravages of the moth could be prevented; but for extensive operations it would not be well suited—except perhaps in a peculiarly favorable climate. Will Dr. Gantt oblige us with an account of his method of keeping the moth at bay?

[For the "Bee Journal."]

DESTRUCTION OF DRONE BROOD.

On the 9th of April I found, in a strong stock of Italian bees, a drone-comb full of eggs and larvæ. On the 22d this comb contained eggs and larvæ in about the same degree of forwardness. The weather, after the first examination, was wet and cold, but the bees were abundantly supplied with pollen and were regularly fed. Still they destroyed the drone-brood, and on the return of warmer weather began to raise more. A very much smaller stock, examined on the 22d, had drone-brood only a few days younger than the strong one. On the 1st of May, all their drone cells were filled with honey. The nights having been quite cool, the bees destroyed the drone-brood, leaving the worker-brood in the adjoining cells untouched. It is very difficult, even with strong stocks and careful feeding, to induce bees to raise drones much in advance of the season.

L. L. LANGSTROTH.

[From Samuelson's "Humble Creatures."]

THE BEE'S PLACE in the ANIMAL KINGDOM.

The division of the Class of Insects, by naturalists, into *sub-classes* and *orders* has been effected, first, by reference to the degree of metamorphosis which the group undergoes; and, secondly, to the absence or presence of wings, and, where these are present, to their number and character.

Thus, one group or sub-class that undergoes *no* apparent change, is called *Ametabola*; a second, in which the metamorphosis, though perceptible, is not complete, is called *Hemi*metabola; and the third, or highest subdivision, in which there is a complete transition from the worm-like or larvæ state, first to the pupal or motionless stage, and next to the imago or perfect insect, when the actual metamorphosis is effected and the creature bursts forth from its tomb, fully fitted, both internally and externally, for its aerial existence, is called *Holo*metabola. And here we shall find our honey-bee, along with the beetle, the fly, and many other insects.

On examining the wings of the bee, we shall perceive them to be four in number; but this is not a sufficiently unique feature in its organization to enable us to determine the *order* to which it pertains; for there are several other orders, of widely different types, such as the Coleoptera (beetles), Lepidoptera (butterflies), &c., all of which possess two pairs of wings. We must look therefore at the character of the wings themselves, and shall find them to be of a firm parchment-like texture. Hence it is that the Order has received its name, *Hymenoptera*, from two Greek works, denoting the membranous structure of these organs. To this Order belongs not only the bee, but also the wasp, the ant, and some other insects, all remarkable for their highly developed instinct. These minor groups are termed *families;* and that which includes the bee is the family of the Apidæ, or true bees—the honey or hive bee being scientifically known as *Apis mellifica*.

The former designation (*Apis*) is that of its *genus*, and the latter (*mellifica*) of its *species;* but although its specific name is derived from a Latin word denoting its honey-making properties, it is not because it is the only species of bee that produces this delicious substance (for there are others possessing the same attribute), but it is because to *us* its hive-labors render it par excellence *the* honey bee. Once more, then, *Apis mellifica*, the honey bee, belongs to the *family Apidæ*, or true bees, included in the *Hymenopterous* (membranous-winged) *order* of the *class Insecta* or insects, and in that subdivision of the class known as *Metabola* or *Holometabola*, in consequence of the contained forms undergoing a complete metamorphosis; whilst (to complete our classification) the Insecta themselves occupy the highest rank as a *class* in that *province* of the Animal Kingdom known as the *Articulata* or Arthropoda (articulated feet), which are in their turn included in the great *sub-kingdom* of *Invertebrata*, or animals *not* possessed of an internal vertebrated skeleton.

Mr. Stochr, of Würzburg, says he has repeatedly seen young queens, in recently issued second swarms, pursue each other and engage in mortal combat; and he witnessed one case when both combatants perished in the struggle. A similar instance came under the notice of one of his friends. Usually, a strange queen which enters a hive, is dispatched by the workers, fecundated queens appearing to be instinctively anxious to avoid conflict with a rival. He infers that fertile queens are attacked or defended solely by the workers, and that the celebrated deadly duels take place only between rivals yet unfecundated—neither having then secured the attachment and allegiance of the workers.

Mr. Walter, in an article on wintering bees, asserts that colonies which have no stores of pollen, or are only meagerly supplied therewith, will not be injured, but rather benefitted, by being placed during winter in a dark depository with a moderate temperature. On the contrary, colonies well supplied with pollen, will be brought to the verge of ruin by being placed in such a depository, with the temperature considerably above the freezing point.

This may, perhaps, explain the discordant accounts beekeepers give of the results of experiments made in this mode of wintering bees.

Dr. Jähne says that if a field of buckwheat, in blossom, be situated near an apiary, and Linden trees are in bloom at the same time, at a somewhat greater distance, the bees will neglect and pass over the former to forage on the latter.—Buckwheat, as cultivated in this country, seldom blossoms at the same time with the Linden, so that opportunities for testing this are rare. Buckwheat, moreover, in some soils and seasons, fails to yield honey when in flower; and this may have been the case when Dr. Jähne made his observations.

☞Two natural swarms, hived on the same day, should not be placed near together in the apiary; and the same rule should govern in the disposing of newly made artificial colonies.

(From the "Bienenzeitung.")

Scouts, or the Fourier Bees.

Just before and during the swarming season, we may annually see bees entering and creeping about holes and crevices in old buildings, walls, and trees, apparently in search of something, passing in and out, flying off singly and returning, or hovering eagerly around the selected spot. At times the party is so numerous, and its behavior so orderly and regulated, that it requires a practical eye to decide at once that they are scouts, and not a newly issued swarm. When there happens to be no vacuum behind the crevice, into which they can enter, I have known them to cluster against the flat surface of the wall, covering somewhat densely a space six or eight inches long by two or three inches broad; but they were evidently restless and uneasy, unlike the outlying bees of an established stock. Such bees are usually regarded as belonging to some hive nearly ready to swarm, and as *scouts*, sent forth from it to select and prepare a residence for the coming colony.

I have seen them almost every year assembled thus on the turrets of an old castle, on the walls of my garden, and against the gable of my barn. The shallowness of the crevices about which they gathered, not furnishing room enough to accommodate even the smallest *cast*, and the fact that no swarm ever arrived after the most promising of these preparatory demonstrations, though natural swarms escaped almost every spring from my apiary, led me to doubt the correctness of the prevalent notion, that these bees were scouts. In the spring of 1844, I concluded to test the matter by careful experiments, and note the results. On the 12th of May, the first bees were observed at a crevice in the wall of my garden, and in the evening I directed my gardener to dust them well with pulverised chalk, while I stood in front of my apiary, to ascertain on their return, to which colony they belonged. I had not to wait long for their arrival; and the whole number entered hive No. 77, containing a very strong colony. Early next morning numbers were again seen on the wall, and so successively for four mornings. They were dusted with chalk every evening, and all returned to the hive just mentioned, as did also the bees of several small clusters on other parts of the wall. At about ten o'clock on the morning of the 17th, a powerful swarm issued from No. 77, passed off in the direction of the scout party, but clustered on a dwarf tree about twenty paces from the apiary, where it hung exposed to the direct rays of the sun. I suffered it to remain undisturbed though watching it closely. Shortly before eleven o'clock it rose, but quickly clustered again in a shady spot at a short distance, where it remained till three o'clock in the afternoon. It then started anew and passed rapidly over my summer pavilion into the open fields beyond the garden. My assistant followed afoot; and I mounted a horse in pursuit; but before I overtook him, the swarm had vanished from his sight, and we failed to get any account of its whereabouts afterwards. On our return we found the scouts still congregated on the wall, and when dusted in the evening, they returned to the aforesaid No. 77. On the 18th, they re-appeared there, as we supposed; but on dusting them at eve, they returned to No. 7—showing that these were of a different stock; not one of them went to No. 77. Early on the morning of the 19th, I had the crevice in the wall carefully closed with mortar, and placed a straw hive on a bottom-board, directly in front of it. When the bees arrived, they passed in the rear to the closed crevice, but soon returned and entered the hive—formally taking possession. I repeatedly lifted it slightly, but could only see that the bees were coursing about it, without making any efforts to cleanse it. In the afternoon of that day, hive No. 7 swarmed; and the bees, after trying two different places, finally clustered on a shaded limb of a linden tree—affording me a convenient opportunity to observe all its proceedings. Individual bees flew off in various directions (previously noting the place of departure in their usual manner), and some of them returned. The swarm remained clustered there all night. At early dawn next morning, I and my assistant resumed watch, having previously set the garden gates wide open, and put two horses, saddled and bridled, in readiness in the care of the hostler. At half-past five o'clock, I saw several bees suddenly leave, flying in a southerly direction, none of which returned. At half past seven, the entire swarm left, and followed in the same direction, flying low and slowly, a considerable number being plainly visible in advance of the main body. My assistant accompanied them on horseback, whilst I went afoot, easily keeping pace with the advance party, and satisfying myself that the swarm was moving steadily and confidently towards a pre-determined spot. When they passed out of the garden I mounted the other horse and joined my assistant in pursuit. We followed the swarm at a moderate trot about a mile, when, still flying low—not more than from four to nine feet from the ground in a southerly course—it rapidly increased its speed, compelling us to ride at full gallop to keep up with them. Arriving at the next village, distance some three miles, we saw the swarm pass into a cottager's

garden. I leaped my horse over the hedge, and reached the spot just as the swarm was entering the hollow stem of a pear tree. It entered so unhesitatingly and quickly, that I could not for a moment doubt that this receptacle had been selected before the swarm left my garden. In less than twenty minutes the workers began to carry out broken splinters and particles of rotten wood, and returned with pollen, &c.

I repeated this experiment four times in 1845, with partially different results. Three swarms actually entered and occupied the hives which had been placed in readiness for them and which were tenanted in advance by the scouts. But the fourth absconded, and after flying four or five miles entered a forest, where further pursuit was impracticable, on account of the dense underbrush. It was remarkable that in these six experiments, the three swarms, which took possession of the hives, had each settled only once, after issuing from the parent hive; whilst the other three had each removed several times from place to place, before finally leaving.

I subjoin succinctly the other observations made on these occasions.

1. The scouts never remained out over night, but left the holes and crevices gradually towards evening, and all had disappeared when the bees of the apiary ceased to fly.

2. They did not make their appearance in the morning, immediately when the bees in the apiary began to fly, but an hour or two later.

3. On cold or raw days, few scouts were seen, and occasionally none made their appearance.

4. When sudden showers or gusts of rain occurred, they hastened to their hive, like bees returning from the fields—though occasionally a few scattering ones remained, like bees surprised by stress of weather.

5. They made their first appearance at the approach of the swarming season, and generally disappeared before its close.

6. Dusting them with pulverized chalk enabled me to ascertain that all of them did not in every instance belong to the same hive. Sometimes there were individuals from three or four colonies gathered at one crevice. This, however, occurred only when several nearly adjacent crevices were frequented by bees. At isolated crevices, we always found bees from one colony only.

7. When bees from different colonies were assembled at the same crevice they frequently attacked each other; but I never saw any killed outright or fatally injured.

8. The bees invariably belonged to colonies nearly ready to swarm, though the scouts sometimes made their appearance ten or eleven days before the swarm issued.

9. I never saw a scout that carried pollen, nor were any drones ever seen among them.

10. They would sting only when violently enraged, as by breathing on them in the crevices; and even then it was a rare occurrence.

11. Their honey-bags contained very little honey—frequently none at all.

12. I could not ascertain whether any of them left to gather honey. I am inclined to believe that they did not leave for that purpose, but solely to keep up communication with the parent hive. When they were dusted with chalk at noon, I noticed only a few returning to the apiary.

13. There was no trace of combs nor any indication of preparation for comb-building perceptible in any of the holes or crevices.

What reliable inference may be deduced from these observations, as to the character and object of these scouts? Nothing more than that these bees are members of colonies nearly ready to swarm. Only this, and nothing more. Perhaps other apiarians will institute more diversified experiments, and throw light on this obscure and as yet mysterious point. BERLEPSCH.

(For the "Bee Journal.")

A WINTER PASSAGE.—Cheap and Permanent.

Some years ago Mr. W. W. Carey, of Coleraine, Mass., after cutting winter passages in the combs, put in them a coiled shaving, to prevent the bees from filling them up. I contrived a mode of *suspending* this shaving in an *empty* frame, so as to induce the bees to leave the passage open in building their combs. A thick shaving of any tough wood is coiled into a circle of about one inch in diameter and three-fourths of an inch wide, and a strip of tin about one-fourth of an inch wide at one end and one-eighth at the other, is pushed through this shaving where the ends lap together. With a small knife a slit is made on the under side of the top slat of the frame, into which the narrow end of the tin strip is pushed. The wide end projects a little below the shaving.

Unless a suitable winter passage is given to the bees, movable comb hives cannot be used to advantage in cold climates. L. L. LANGSTROTH.

Oxford, Ohio.

MR. OETTEL has observed that when a colony deprived of its queen undertakes to rear one from brood, they select larvæ already sufficiently advanced to form a perfect circle at the bottom of the cell, whenever they have brood of various ages from which to choose.

[For the "Bee Journal."]

I will illustrate my mode of dividing bees. Numbering my hives—**1, 2, 3, 4, 5,**—being all about equal in strength, I take from Nos. 1, 2, 3 and 4, two combs each, with eggs, larvæ, sealed bees, and honey, replacing them with empty frames, brushing back all the bees, and putting them into a new hive, No. 6. I place this where No. 5 stood, and remove No. 5 to a new stand when the bees are in full flight, so that the returning bees would enter the new hive, which would stand thus—**5, 1, 2, 3, 4, 6.** By this I would gain one strong stock, without materially reducing any one. If I have a spare queen cell to put into the new hive, so much the better. Within a few days I repeat the operation, and let the hive that has the fewest bees in flight remain untouched; always removing the extra queen cells, if any. In this manner I am able to keep my bees from swarming, and to secure the greatest yield of honey—always having an eye on the yield of blossoms to secure honey from. Whenever they appear to diminish, cease operations; as a small and sure increase is the greatest in the long run. This mode, I think, will also give me the greatest amount of increase, as I can commence earlier than I could if I divided only one at a time, and continue longer at it—as each new hive would have eight of the ten frames full of combs, and a few days producing honey would enable them to secure enough to winter safely. It is best to have an eye on the hive that is to be removed, that too many bees do not leave, and the brood be unprotected. In such case it would be best to change back. If it is convenient, it would be better to obtain bees from a distance, to supply the old stock removed, as recommended by Langstroth in his work, chapter on artificial swarming. I would recommend to new beginners in the business to commence with at least two stocks, even should it be necessary to sell in the fall, as by keeping the hives well filled they will thrive much faster, in proportion, than if one stock were divided into two parts. S. C. Brown.

Ravenna, Ohio.

☞Young queens which were unsuccessful in meeting drones, and have once commenced to lay drone-eggs, will not afterwards repeat their excursions. If a second swarm be put in a hive furnished fully and exclusively with worker-combs, a young queen may be confined to it for many weeks without beginning to lay drone-eggs. Nay, she may still become fertile, if permitted to fly, after a confinement so prolonged that it would seem to render such a result utterly hopeless.

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CHOICE HONEY CROPS.

The movable comb hive is peculiarly adapted for the purpose of collecting and securing, in its pure state and unmixed with other kinds, the honey yielded by any particular species of tree or plant. For instance, where lindens, locusts, peach or other trees abound; or where white clover, mustard, lavender, sage, or similar plants are largely cultivated; it is only necessary, when any of these are in blossom, to insert frames with empty combs in the hive and remove them when filled. If the honey is intended for immediate use, it is not necessary to delay the removal till the cells are sealed over, and the contents can then be more readily drained out and the combs the more speedily re-inserted. But to secure this object completely and secure the largest amount of the particular kind of honey desired, there should be no unsealed brood in the hive during this period, as it would demand a large expenditure of time and attention on the part of the workers, and involve no inconsiderable consumption of honey. The queen should therefore be confined or removed five or six days prior to the intended operation; and released or restored after it is ended. The brooding chamber or proper dwelling place of the bees, should also be amply stored with common honey, so as to offer the workers no vacant spaces or empty cells; because they would instinctively fill their immediate quarters with stores, before carrying honey to the more remote parts of the hive. Hence, when any particular kind of pasturage abounds, and the brooding apartment is yet partially empty, it will be serviceable to take out the frames with empty combs, and insert combs of sealed honey instead—thus constraining the bees to carry their daily gatherings to the combs designed to receive them. When the apiarian has once thoroughly established the movable comb system in his apiary, he will almost always have on hand supplies of frames with sealed honey, and be prepared to effect the requisite arrangements. But if he is yet a new beginner, he should remember that full combs may be taken for this purpose from such common hives as are not intended to be wintered; or if he should subsequently conclude to preserve them, the honey may be restored after it has served this temporary purpose.

☞The vertical position of royal cells does not appear to be an indispensable requisite for the perfect development of queens; because queens have been reared in cells lying horizontally on the bottom board of a hive. The essential requisite seems to be a constant and abundant supply of royal jelly.

Fertile Workers.

In certain conditions of a colony, workers occasionally occur which lay eggs. In some cases, these eggs are few in number and irregularly placed; in others, they are numerous and deposited with nearly as much regularity as if they had been laid by a queen. These eggs will hatch; but they invariably produce drones. The facts have been known to apiarians for more than a century. In queenless colonies drone-brood has been found in innumerable instances, produced in constant succession, which, as no queen was present, and drones are males, could only have originated from eggs laid by workers. On stupefying the bees of such a colony by fumes of sulphur, and minutely inspecting each individual, the absence of the queen was placed beyond doubt; and on dissecting workers caught by Huber in the act of laying, Miss Jurine discovered that their oviducts contained eggs; and subsequent examinations have shown that these eggs resemble, in all respects, those laid by queens.

This singular phenomenon is, nevertheless, not so surprising as it, at first view, appears to be—since the workers and the queens are both produced from the same kind of egg. The queen, being a fully developed insect, has attained the ability of completely discharging her natural functions; whilst the worker is one whose development has been partially arrested, and is consequently not qualified to assume completely the position to which it might, under other circumstances, have been advanced. It is hence by no means surprising that we should find different degrees of retardation in different individuals; and that some workers should be met with which are somewhat more advanced than the generality—more nearly approaching in some respects the character of queens, and to some extent qualified to lay eggs.

Until recently, however, it seemed an inexplicable mystery that the eggs laid by such workers produced drones only—none ever producing a worker, much less a queen. But this is a mystery no longer. Physiological science has demonstrated that these egg-laying workers are insusceptible of fecundation; and it has, moreover, been clearly ascertained that all the eggs found in a hive, whether they were laid by a worker or a queen, produce drones only, if they were not impregnated by male sperm. It is, besides, now well known that these egg-laying workers are mere exceptions to the general rule, occurring only casually, and almost always only in queenless colonies. They are not consequently, as such, constituent or essential members of the community, in which nominally the queen lays all the eggs.

Generally only one worker qualified to lay eggs actually does so, when a colony becomes queenless, though there may be many more present. Berlepsch says that when he subdivided into three or four nucleii, a colony whlch had *recently* lost its queen, and in which eggs continued to be laid, oviposition was continued only in one of them. But when he subdivided, in like manner, a colony which *had long been queenless* and had been much reduced in numbers, eggs were laid in nearly all the nucleii.—Huber found twelve in one colony; and Berlepsch discovered twenty in a weak stock consisting of less than three hundred bees. The weaker a queenless colony is, the more the workers seem disposed to lay eggs, as though they no longer regarded themselves as members of a community, but as independent individuals—each separately and specially interested in the preservation of the race. They occur most frequently in colonies which have been queenless five or six weeks, and which do not possess the means of raising a queen; usually also in colonies which have sent out several swarms, and have finally become queenless; and in second swarms which lost their queens before they became fertile. They are rarely found in colonies which, though queenless, have the means of rearing one; yet eggs will sometimes be laid in such colonies before the young queen emerges from her cell.—Still more rarely are they found in colonies which have unfecundated queens; and most rarely of all, in the presence of a healthy fertile queen—as is evident from the fact that, on the removal of such a queen, egg-laying almost invariably ceases immediately. Still, freshly laid-eggs have been found within four days after the removal of a queen; and Dzierzon records one instance where a fertile worker laid eggs in a hive which contained a fertile queen. This was in a colony of Italian bees into which combs containing sealed brood of common bees had been introduced. The drones must have originated from eggs laid by a common worker, as they had just left their cells, and were still unable to fly.

If the hive contain drone-comb or drone-cells, fertile workers will lay in these, and resort to workers' cells only when no others are at hand. They will also lay in rudimentary royal cells; whereas drone-egg-laying queens will lay in worker-cells only—though Huber states that the latter will also lay in royal cells.

These fertile workers are not fecundated, and not susceptible of fecundation. On dissecting a number of them, Prof. Leuckart found in their ovaries from two to twelve ovarial tubes, contain-

ing eggs precisely similar in size and shape to those laid by a queen—each egg having a perfect mycropyle apparatus. But in each case, the spermatheca, like that of an ordinary worker, was merely rudimental, could only be seen by the aid of a microscope, and contained not the slightest trace of seminal matter. This proves conclusively their unfecundated condition; and that even if they were susceptible of fecundation, they do not possess any proper seminal receptacle, such as pertains to queens. Prof. Von Siebold, after dissecting some, also remarks,—"the eggs laid by a worker cannot be impregnated by her, because her spermatheca never becomes developed or enlarged, and the peculiar structure of the abdomen precludes intercourse with the male."

Huber found that some workers reared in cells, situated near a royal cell, were capable of laying eggs; and hence inferred that they may accidentally have received a portion of the royal jelly, whereby their sexual tendency became more strongly defined, though not fully developed.—Others have supposed that when a fertile queen suddenly dies, or is removed before royal cells have been started, the bees, in their eagerness to supply their loss, commence feeding a large number of worker larvæ with royal jelly, though they subsequently restrict their attention to a few only. Those which were thus temporarily made recipients of this bounty, it has been imagined, were proportionally more fully developed, and thence qualified to lay eggs. They *may* indeed, originate in either or in both of these modes; but these are certainly not the only ones—for fertile workers are sometimes found in colonies which have not for years raised queens, or even made any preparation for doing so. Berlepsch mentions a case strongly illustrating this. His finest Italian queen died in December, 1856. He had marked her in 1855, by clipping her wings, and was therefore certain that he had before him the identical bee; and he knew, moreover, from frequent examinations of the hive, that no queens had been reared by the colony, or attempted to be reared, since May, 1855. Yet he found drone-brood in the cells in February, 1857. Certainly not a bee then existing in the hive could have been bred in the vicinity of a royal cell, or by accident have received a portion of royal jelly while in its larvæ state. Consequently some workers must be able to qualify themselves to lay eggs, or become so qualified by the aid of others. Some may feel themselves sufficiently developed to be able to oviposite, or their companions may instinctly perceive that they are so developed, and treat them accordingly. If the workers can, by withdering or withholding supplies of nutriment, influence and regulate the queen's egg-laying, may they not exert a similar influence on such workers, when the condition of the colony is auspicious? Dr. Dönhoff fed a small queenless colony two weeks with a mixture of honey and white of eggs, and then sent eighteen of the bees to Prof. Leuckart for examination. On dissection, the oviducts of nearly all of them were found to be considerably enlarged, and in those of four of the younger bees eggs were distinctly visible. This shows that the oviducts of young bees especially are susceptible of some degree of development, by stimulating food; and as the royal jelly is a highly nitrogenous substance, it doubtless tends to give increased development to the oviducts of those workers to which it is administered, because they are regarded and treated as queens. It is thus by no means improbable that fertile workers are produced, in most instances, by being fed and treated by their companions in the same manner as queens are treated when increased prolificness on their part is desired by the community. And if the recipients of these extra attentions and specially stimulating supplies be still young, it is probable the object will be the more readily attained. This, too, would serve to account for the fact that colonies which have sent out swarms, if they become queenless soon after, and also second swarms in like predicament, so frequently contain fertile workers; whilst these so rarely occur in colonies which were safely wintered and lose their queens early in the spring, before drones have made their appearance. Yet it is remarkable that colonies which lose their queens in summer, never produce drone-brood, though they remain queenless two or three months.

These fertile workers are not all equally developed or equally qualified to lay eggs—some more nearly approximating to the character of queens, than others. This is evident from the different manner in which they supply the cells. Some lay with considerable regularity, supplying cell after cell, like a healthy, fertile queen; attaching the eggs properly to the bottom of the cells. Others proceed very irregularly—sometimes laying three or four eggs in one cell, and rarely attaching any of them properly to the bottom. Some are very prolific, and others lay comparatively few eggs. There seems also to be no external mark by which they can be distinguished from the common bees.—Berlepsch says, that in 1859 he had a drone-breeding colony, in which more than 4000 cells were supplied with eggs, with as much regularity as though they had been laid by a queen. He carried the hive to a close chamber, stupefied the bees, and inspected each individual minutely; but could detect no difference between them. Yet the

differences in the deportment of the colonies show that there must be corresponding differences in the character and qualifications of the pseudo-sovereigns. So long as the population is still numerous, it is in some cases exceeding difficult to ascertain the real condition of things without an actual inspection of the combs. The bees will fly as briskly, gather honey and pollen as freely, make as loud a humming at eve, and flare up as brusquely when their hive is struck, as though they really lacked nothing, while one of the most essential elements of prosperity is wanting. Yet, if worker-brood be introduced, they will neglect or refuse to rear a queen; if a sealed royal cell be inserted, they will reject or destroy the embryo; or if a fertile queen be offered to them, she will be summarily dispatched. In such a colony one sole fertile worker appears to officiate as queen, and is recognized in that character by the masses.

Others will begin to build royal cells, if worker-brood be given to them, but suddenly stop work and leave them unfinished; or if they proceed to finish and seal the cell, they will still perversely destroy the embryo before it reaches maturity.—Sometimes they accept and foster a sealed royal cell; but this is a very rare occurrence—their proceedings are so fitful and their whims so various, that the result is ever uncertain. They appear to be in doubt at times whether they have a queen or not; or the workers are divided into two factions, one of which delights in thwarting and counteracting the plans or projects of the other. Hence such a colony will at times accept an offered fertile queen, and retain her three or four days, yet finally dethrone and discard her. The most singular circumstance, however, is that if a queen thus temporarily retained, is very prolific and lays eggs freely before she is killed, the workers will proceed very methodically to rear a queen from her brood, and drone-egg-laying ceases as soon as the young queen becomes fertile. It has been conjectured that in such cases the queen retained for a time, is *always* killed by her jealous drone-egg-laying rival. This may indeed *generally* be so; but the bees themselves are certainly at times the rebellious party, as they have been observed suddenly to seize, envelope, and suffocate her.

Some colonies which have egg-laying workers, will readily accept an offered fertile queen, or rear one from worker-brood when placed at their command. These seem to be fully aware of their destitute condition, and anxious for speedy relief. If their hive be struck before a queen is offered, they respond promptly with their peculiar doleful moan of conscious queenlessness.

In some colonies, done-egg laying will be continued for weeks, after a fertile queen has been introduced and accepted—ceasing only gradually at last. These are generally such as contain a considerable number of fertile workers, none of which regards herself or any of her companions as of regal dignity, and all of which are hence prepared and disposed to renew their fealty to the true blood royal. Dr. Dönhoff once caught a bee of such a colony, as she was returning to her hive laden with pollen, and on dissection found eggs in her oviducts—warranting the conclusion that fertile workers were unusually numerous in that hive.

Attempts will be occasionally made in some such colonies to raise queens from drone-brood. But the embryo never reaches maturity—always perishing in its pupa state; probably, because royal jelly is not the proper sustenance for drone larvæ. In such cases the colony is certainly conscious of its queenless condition, as even these abortive efforts to apply a remedy clearly indicate.

Occasionally also, a colony which has neither queen nor brood, rejects an offered fertile queen, because the fertile worker to which it has been accustomed to do homage, though she has now lost her ability to lay eggs, is still acknowledged and treated as a queen. Bees may likewise, from some cause or for some reason, be induced to regard a common worker as their queen, though she never lays an egg. Dzierzon once had a queenless colony, *in which no* drone-eggs were laid; and yet it killed in succession three fertile queens which he introduced. Finally, when the population had become greatly reduced, he examined the bees thoroughly, and found among the number one which was manifestly very old, attended by a cortege of workers, and treated like a queen. He removed and killed her, and the colony soon displayed all the uneasiness, restlessness and distress usually exhibited by one whose queen has been lost or removed. He then offered them a fertile queen which was promptly and joyfully accepted. Dzierzon supposed that the pseudo-queen, though incapable of laying eggs, may have been able to emit sounds somewhat similar to those which queens occasionally utter, and which so powerfully affect the workers; and that she thereby induced her companions to regard and treat her as their sovereign.

It is singular that this faculty of laying eggs, which is certainly not possessed by all workers, is so common among wasps, humble bees and ants, that very few workers belonging to these classes can be found which are not so endowed.

☞ The Favignanese beekeepers regard the want of pollen at the approach of spring, as one of the chief causes of dysentery among bees.

[From Samuelson's "Humble Creatures."]

Development of the Bee.

In the first stage of its existence, that is to say the larvæ state, after it has proceeded from the egg, the young bee resembles a minute, yellowish-white worm, exhibiting to the naked eye no trace of external organs or members. The lens, however, reveals an imperfect oral apparatus or mouth, for the reception of food (administered to it by the workers whilst it still remains in the cell), and on the lower lip a pair of spinnarets, with which it spins its cocoon preparatory to assuming the second or pupa state.

The body of the larvæ is divided into thirteen rings, and a row of spiracles or breathing holes may be detected on either side of the body, one situated upon each ring.

It is, however, not a very attractive object, having the appearance of a great over-fed maggot, and the wonder is that from such an imperfect and ungainly form there should, in the course of a few days, be developed the perfect little bee, with all its organs and members; eyes, simple and compound; wings, legs, and all the other portions of its external organization.

In the metamorphosis from larvæ to pupa, a constriction takes place between the first and second, and another between the fourth and fifth rings of the body; the first becoming transformed into the head, with its antennæ, oral apparatus, &c.; and the second, third, and fourth into the thorax with its accompanying members; whilst the remaining rings constitute the abdomen. The large compound eyes at first resemble two small dark streaks, one on each side of the head, and even at this early stage their composite structure is discernable under the microscope. The various members of locomotion do not grow out of the body, but appear upon the surface, moulded, as it were, under the manipulations of the invisible hand of nature.

At first they remain adherent to the body throughout their whole length; but as the metamorphosis proceeds they become detached, and at length the yellowish pupa (for it retains the characteristic color of the larvæ for some time after the change has begun) assumes a dark-brown hue, the external skin becoming hardened.—Simultaneously with these external changes in the bee's structure, a transformation is taking place in its internal anatomy. This, in the larva, is of the simplest kind, being adapted to the habits of the insect, and ministering to its rapid growth.

The digestive organs are the most prominent, but even these consist chiefly of a large intestine, and they do their work so efficiently, that an immense quantity of fat is stored up in the body of the little larva as raw material, of which the more complicated organs of the imago or perfect insect are built up.

But, quitting the consideration of the mysterious changes that are veiled from our sight, we shall direct our attention to the active operations of the workers in connection with this part of the bee's history.

The poor worm usually lies curled up in a half circle in its cell, and the only symptom of life that it exhibits is by scratching with its mandibles against the cell-wall, as an intimation that it requires nourishment. It, however, becomes the tenderest object of solicitude on the part of the workers, which constantly supply it with infant food prepared from honey and pollen, and offered to the little nursling at the point of their ligula or tongue. The whole arrangement of the attendance resembles that in a foundling hospital. The watchful nurses pass from crib to crib, from cell to cell, offering food to the little inmates, stroking them with their antennæ, and fondling them with their delicate organs of nutrition.

After they have been thus treated for a few days, the nurses discontinue the supply of food, and close up the orifice of the cell with wax. This operation they perform by appying a series of concentric rings of gradually decreasing circumference, one within another, until there is nothing left but a small hole in the centre, which is then blocked up with a particle of wax. As soon as the cell is closed, the inmate sets to work and spins a cocoon of silk (which the *queen*-larva accomplishes in about twenty-four hours, and the *worker* in thirty-six), and then rests for two or three days. At the end of this time it assumes the *pupa*-form, undergoing the metamorphosis from the worm-structure to that of the insect; and when this is complete, the *imago* or fully developed insect, first frees itself from its silken envelope, and then, forcing open the lid of its prison-house by means of its head and mandibles, makes its escape, a perfect bee.

The time occupied from the deposition of the egg to the final appearance of the insect is, for the queen sixteen days, for the worker about twenty, and for the drone twenty-four days.

But the labors of the worker in regard to the tending of the brood do not end here. After the young insect, be it worker or drone, has effected its escape, a number of busy nurses at once set to work and prepare the vacated cell for the reception of another egg. First, one enters, and searching for the pupa-case, drags it forth and carries it away to the entrance of the hive; a second follows and brings away the exuviæ of the larva; and then other succeeding bees clear off every particle of refuse; leaving only a portion of the silken cocoon, which gives additional strength to the cell.

(From the "Country Gentleman.")

L. L. LANGSTROTH'S PATENT BEE HIVE.

EDS. CO. GENT.—I wish through your columns to make some statements to the beekeeping public respecting my patent hive.

When I applied for this patent, I was not aware that movable comb hives had ever been used, except those with movable bars or the sectional frames of Huber. The former required the combs to be cut from their side attachments, while the latter were so costly and demanded so much experience, time and patience to open and close the sections, that notwithstanding they were invented at the close of the last century, they were confined almost exclusively to amateur beekeepers.

In the first and all the subsequent editions of my work on the Hive and Honey Bee, I have given the plan of the Huber "leaf hive," and while describing its defects, I never attempted to conceal my obligations to this "Prince of Apiarians." Speaking of him I say: "Very early in my apiarian studies, I constructed a hive on the plan of the celebrated Huber; and by verifying some of his most valuable discoveries, became convinced that the prejudices against him were entirely unfounded." And again—"The use of the Huber hive had satisfied me that with proper precautions the combs might be removed without enraging the bees, and that those insects are capable of being tamed to a surprising degree. Without a knowledge of these facts, I should have regarded a hive permitting the removal of the combs, as quite too dangerous for practical use."

In the first edition of my work published in 1853, I say: "If Huber had only contrived a plan for suspending his frames, instead of folding them together like the leaves of a book, I believe that the cause of apiarian science would have been fifty years in advance of what it now is."

Now if I had known that my hive was not so much better than Huber's as to deserve a patent, and if I had been base enough to attempt to palm upon the public substantially his invention as my own, can any man of common sense believe that I would have published to the world, just where and how I *stole* my pretended invention? And yet this is substantially what I have been charged with doing.

Since my application for a patent, I have ascertained that prior to my invention other movable frames, besides those of Huber, were in use in Europe. None of them, as far as I can learn after thorough inquiry, are any better than those of Huber. I would refer those who desire information on this point, to the *Cours Pratique D'Apiculteur* of M. Hamet, published in Paris in 1859, which contains a larger variety of cuts and descriptions of hives than can be found, I believe, in any other work. All the modifications of the Huber hive are pronounced by Hamet to be useful only for purposes of observation, and he asserts that in the districts of France, where beekeeping is most largely pursued, no movable frame hives here ever come into general use—and that the removal of the frames from the best of them is often more difficult than from the Huber hive. He closes his account of these hives with the significant remark, that "in a moment of enthusiasm he once supposed that such a hive might be cheaply made, but that he had tried in vain."

Now compare these results in France, with the extensive use, by the best practical beekeepers in this country, of the movable comb principle, and the inference will be almost irresistible that they have not *yet* invented a cheap and practical way of using movable frames.

In the Beekeeper's Convention in Cleveland, last March, an article was read from a recent English publication, in which all hives with movable frames are declared to have no practical value. Of all the movable frame hives now in use on the Continent of Europe, the Berlepsch hive is probably the best—(for a description of this hive, see American Bee Journal for Jan.) It was invented subsequently to mine, and uses essential features covered by my patent, without which this German hive would have no more practical utility than those which have so signally failed.

Allow me to give an extract, in this connection, from a letter received by me last fall from the Baron Evon Linsingen of Oznaborick, Kingdom of Hanover, dated 10th of August, 1860—"I feel convinced that no other apiarian has been able to construct a movable comb bee hive in such an advantageous way as you have done. On the 20th of September, the apiarians from all parts of Germany assemble in Hanover to have a grand consultation about the hive and honey bee, and I wish you to send to my address two of your hives."

The order came too late to be filled in season for the convention. Were I to attempt to show in what particulars the various patents* in this country, using movable frames, have appropriated to a greater or less extent the essential and patented features of my invention, I should require more space than in the largest liberality you would be willing to give, besides opening a personal controversy in which comparatively few of your readers would feel any interest. This much, however, I wish to say, that in my opinion all of them use some of these features, and that without this use they would be of no more practical value than the European hives. I believe that the courts of law will sustain this opinion, and I should, long before this, have sought their protection, but for my limited pecuniary resources, the state of my health which has caused the loss of more than half of my time for the last nine years, and the fact that other parties own the greater part of my patent. I have never sought for more than my rights, and if any one can show that before my invention there existed any movable frame hive adapted to practical use, or any invention that used the essential and patented features of mine, I will try to be the first to acknowledge that although an *original* inventor, I was not the *first* inventor of such a hive. L. L. LANGSTROTH.

Oxford, Butler Co., O., April 10, 1861.

*Mr Baldridge is entirely misinformed in supposing that there is no patent on the Harbison hive. It was patented in 1859.

(From the "Bienenzeitung.")

RAISING QUEENS.

If after depriving a colony of its queen, a horizontal cut be made through a brood-comb containing eggs and young larvæ, and the upper section which remains attached to the top slat of the frame, be re-inserted in the hive, the bees will construct royal cells and raise queens from the larvæ on the fresh-cut margin of the comb, even if no royal jelly be used to designate the place where royal cells are desired. This process invariably succeeds if the comb be placed in close proximity to the brood in the hive, and the bees be numerous enough to cover the brood-combs properly. If two or three days after, when royal cells have been partially built, another comb with eggs and young larvæ be prepared in like manner and inserted, royal cells will be started on this likewise, and the queens reared therein will mature several days later than those on the former comb. This process may be extended with like success to the insertion of a third or a fourth cut comb, and successive rearings of queens thus secured. The apiarian must, however, be careful to remove and use these royal cells before the inmate of any one of them matures and emerges, or the destruction of the others would certainly follow. By seasonably rearing queens in this manner and placing them, or the royal cells containing them, in small boxes furnished with maturing worker-brood and a few hundred bees, the apiarian may readily multiply queens from a single hive, without interfering with the labors of other stocks; and the population of the hive used for this purpose may easily be kept up, by inserting from time to time, a few combs containing maturing worker-brood taken from other colonies. OBED.

[For the "Bee Journal."]

SLOW DEVELOPMENT OF A QUEEN BEE.

On the 25th of April I made a nucleus for rearing Italian queens. On the 27th they had five queen-cells. After these cells were closed, I noticed another queen-cell just begun. The first queen hatched on the 9th of May. The queen-cell last formed was given to another stock, and the queen did not hatch until the 16th of May. I examined from time to time, so as to be certain that she was not confined in her cell by the bees. She was therefore *twenty-one days* in coming to maturity.

L. L. LANGSTROTH.

DZIERZON watched a queen bee when laying, and noticed that she layed eighteen worker-eggs in three minutes. She appeared to dispatch business still more expeditiously when laying drone-eggs.

AMERICAN BEE JOURNAL.

Philadelphia, June, 1861.

THE BEE JOURNAL AND THE TIMES.

The present unhappy condition of our country has had a depressing effect upon almost every department of business, and upon none more than that of publishing. The minds of the people are so intently directed to the war news, that reading of almost every other kind, is for the time being, thrown aside. We have no desire to repress this feeling of interest in a matter so deeply affecting our national welfare, and yet we would not have our beekeeping friends forget us. Until the breaking out of the war, we had every thing to encourage us, and the prospects of the BEE JOURNAL were so highly flattering, that its complete success appeared to have been removed beyond the peradventure of a doubt. We have still abundant sources of encouragement, and have no doubt that we shall be able to establish it upon a sure and permanent foundation, despite the difficulties which have surrounded it almost ever since it has had existence. It is our determination to leave nothing undone that will merit success, feeling assured that the Beekeepers of the United States will, notwithstanding our national troubles, give us their earnest and hearty support. Our thanks are due a large number of friends who have given us the benefit of their pens and personal influence. We feel deeply grateful for those acts of disinterested kindness, and hope they will be continued.

The BEE JOURNAL *will not*, whatever the present national difficulties, be suspended. We indulge the hope, that the war now raging will soon be terminated, and that peace and prosperity will again reign absolute throughout the country. If these golden anticipations are verified, we desire that the AMERICAN BEE JOURNAL, like the AMERICAN FLAG, may be sustained. There is but one AMERICAN FLAG and but one AMERICAN BEE JOURNAL. As every good citizen rallies round, defends and supports the former, so should every good American Beekeeper give his aid and influence to the latter.

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Monthly Management.

JUNE.

This month usually furnishes the bees with most ample supplies of honey, and if the weather prove favorable to their labors and the colonies be strong and healthy, the hives will be rapidly replenished with stores. Early in the month the white clover, the linden and the locust trees come into blossom; and various other cultivated plants, as well as wild flowers, yield seemingly inexhaustible supplies. The days are long, the nights are warm, and the active little laborers are thus incited to untiring exertion. In most districts swarming now begins; and the swarms now issuing are frequently more valuable even than those obtained in May—being stronger, and coming when pasturage is more abundant.

The unremitted attention of the beekeeper is now demanded. If his bees are in common hives, and the stocks are populous, they will require watching daily from about nine o'clock in the morning till after three o'clock in the afternoon; unless he concludes to drive out a swarm from each that is in a suitable condition for such an operation—thus saving time, avoiding protracted anxiety, and obviating risk of loss from the escape of swarms. Hives for the accommodation of young stock should be previously provided, and every needful arrangement made in advance for the prompt and proper disposal of natural or artificial swarms. All this is the more important when the apiarian has in charge a large number of stocks, in good condition, and many of which are likely to be ready to swarm at nearly the same time.

Driving should rarely be undertaken until the colonies are strong, and the bees cluster out over night; but when that is the case, it may be resorted to with decided advantage. It may now also be usually adopted in the case of colonies in common hives which have much old comb or an old queen. A young and fertile queen should be substituted for the old one in the driven swarm; and in about three weeks, when all the brood in the old hive has emerged, the unserviceable combs in it may be removed, and the workers allowed to construct new in its stead. Should the season, however, be unfavorable, they will be greatly assisted if a supply of empty combs, in good order, can be given to them at intervals.

Dividing stocks, and thus forming artificial colonies, can be conveniently practiced only where movable comb hives are employed. It is a highly interesting mode of multiplying stock; and, apart from its practical utility, affords the apiarian the best possible opportunity to apply and increase his theoretical knowledge. Reading and study will not alone suffice; experience and experiment are needed in addition, to make him a skilful and successful operator, and inspire him with confidence in his own resources.

Many persons regard the division of a colony as so formidable an undertaking, that they engage in it with reluctance at first, even when convinced of the advantage attending or resulting from it. And not a few, after placing swarms in movable comb hives, never venture to use the means thus at command for improving their bee culture. The old-fashioned *gums* are the very best *invention* which such beekeepers could use, and they should never think of introducing any other on their premises. To be of service, the movable comb hive must be used intelligently *as such*—as the efficient means of practically executing what science and theory teach, and season or occasion require.

But there is great danger also that this business of dividing may be *overdone*, by new beginners who have just learned to operate with facility and confidence. The ease with which colonies may thus be multiplied, leads them into temptation; and they go on dividing and subdividing, in season and out of season, till in the end they have neither *quotient* nor *remainder* left. These act on the other extreme; but if they have good sense enough to perceive that the fault is in *themselves*, and *not in the system*, they will speedily be cured of this propensity to grow rich too fast, and content themselves in future with moderate and seasonable, and therefore certain increase. Beginners should ever bear in mind that they are still *learners*, and must calculate on having to pay a tuition fee, in some form or other, before they secure a diploma.

If the weather continues fine and pasturage abundant, so that the bees can gather honey abundantly, they may soon be in want of storage room; and access to some of the surplus honey boxes should be given, even though there be still some vacant space in the brooding apartment of the hive. Bees are at such times more disposed to take possession of surplus boxes, than at a later period, when from diminished supplies, their ardor is somewhat abated.

The later in the season a swarm issues or an artificial colony is made, the stronger it should be, or the more it should be aided, to get in a condition to pass the ensuing winter safely. If a full supply of well-preserved empty combs can be given to such, it will save them much labor and enable them to reserve for future use the honey they may still be able to gather. Combs, in which brood has been reared, may at times be procured from old colonies, and is preferable to new for the use of late swarms or made colonies, because it retains heat better, and thus facilitates successful wintering.

Feeding young swarms for some time after having them, is always beneficial; but especially so in seasons when pasturage is less abundant than usual, or the weather uncommonly dry. It incites them to prosecute comb-building vigorously, so as to make efficient progress in the work, before the daily reduction of their numbers causes them to relax their labor and devolve the task on the new brood of workers, which will probably emerge too late to render much service. The honey offered on such occasions should be greatly diluted, in order to encourage them to the utmost in comb-building, and keep them engaged at it, till their hive is adequately furnished. They should likewise be induced rather to build a small number of full-length combs, than many stout ones; as the latter are ill adapted, in any way, to constitute the winter quarters of the colony.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. VII.

PROPOSITION 10. If a queen remain unfecundated, she ordinarily does not lay eggs. Still exceptional cases do sometimes occur; and the eggs then laid produce drones only.

If the eighth proposition may be regarded as satisfactorily established by what I have submitted in relation to it, hardly any one will be likely to question the correctness of what is advanced in the one now to be considered. The two are in fact in complete accordance with each other. It will be sufficient to show that unfecundated queens do occur, which actually lay eggs from which living drones, and drones only, are developed. Dzierzon mentions a number as having come under his observation. Hitherto I have found only one, which, as it was a remarkable case, I shall refer to somewhat in detail.

On the 13th of March, 1852, I examined a colony of bees which had been confined to the hive, by stress of weather, since the 16th of January, and found it contained a very large amount of drone-brood. I was thus induced to transfer the colony to an observing hive. The operation was undertaken by Günther and myself, and at an early stage of it, we found an active and apparently healthy queen, whose wings were slightly defective. We placed her and the major part of the remaining workers in the observing hive, which had been furnished with an empty comb; and gave them about half a pound of slightly diluted honey, which was carried up in the course of the night. On the following morning we found some eggs in the cells, and soon after saw the queen laying. She had deposited twelve eggs—which she accomplished in three minutes and two seconds—when I removed and immersed her in alcohol, designing to send her for dissection to Dr. Barth, the editor of the Bienenzeitung. The hive from which she was taken contained 1132 living drones, 892 sealed drone chrysalids, 499 larvæ and 122 eggs. The worker and drone-cells had been alike supplied with great regularity. The queen was of the preceding summer, having issued with a second swarm. I never before saw a hive so largely and exclusively stocked with drones and drone-brood.

The queen reached Dr. Barth on the 18th of March, and he reported the following as the result of his examination:

"Her external form and appearance were those of a perfect queen. The defect in her wings noticed by you, must have been very slight, as it could no longer be observed when she was taken out of the liquor in which she was immersed. On opening the abdomen, the ovaries were seen fully developed and the ovarian tubes were densely charged with eggs, which had the size and semblance of those laid by a fecundated queen. No difference whatever was observable even under the microscope. I next proceeded to search for the spermatheca, using the utmost care in dissecting the parts, but after the most minute scrutiny, *none could be found.* This fact is of special signifiance, as showing that this important organ was either totally wanting or so slightly developed that it could not be detected. This was a remarkable peculiarity in a queen producing drone-progeny exclusively."

This examination, by so competent a person, I conceive, fully settles the main question. But when first promulgating his theory, Dzierzon was of opinion that such unfecundated drone-egg lay-

ing queens were of rare occurrence. Though, as before stated, I have myself hitherto discovered only one, I am strongly disposed to doubt this, and inclined to think that they are by no means uncommon. In the course of the numerous experiments I made some years ago, to determine whether the drones are males, and to ascertain whether the fecundation of the queen takes place within the hive or not, I remember distinctly that many of my experimental colonies became drone-producing *in the presence of a queen.* But as I then firmly believed that the drone-eggs in every colony were laid by a special class of workers, it never occurred to me to investigate how those drones originated. But now, since numerous and incontrovertible facts have constrained me to adopt a different view, and convinced me that *ordinarily* no fertile worker is tolerated in a hive having a queen, whether she be fecundated or not, I cannot but surmise that those drones proceeded from eggs laid by unfecundated queens; and that, consequently, such drone-producing queens are of more frequent occurrence than is commonly supposed. Every intelligent and curious apiarian may, however, readily determine the matter for himself. Let him take a dozen second swarms and clip the wings of the queens; see how many of the colonies become drone-producing; and then carefully ascertain whether the eggs from which those drones proceed are laid by the queen, or by a fertile worker in her presence.

PROPOSITION 11. If, in consequence of superannuation, the contents of the spermatheca of a fecundated queen become exhausted; or, if from enervation or accident, she lose the power of using the muscles connected with that organ, so as to be unable to impregnate the passing egg, she will thenceforward lay drone-eggs only, if she lays at all.

The evidence of this is furnished by the following facts:

On the 30th of June, 1857, Mr. Kehrhahn sent to Professor Leuckart a queen fecundated in July, 1854, which, thenceforward to the fall of 1856, displayed an extraordinary degree of fertility, having in the interim laid several hundred thousand eggs. But in the spring of 1857, she laid drone-eggs exclusively. On dissecting her, Prof. Leuckart could not discover a single spermatozoid in the contents of her spermatheca—the supply having been so completely exhausted, in the course of three summers, that the queen could no longer impregnate an egg.

In May, 1854, when placing a queen in a cage, I accidentally compressed her abdomen violently. Though she appeared to have sustained no external injury and speedily regained her usual activity, and recommenced laying in worker-cells with her accustomed regularity when replaced in her hive, the eggs produced drones only. Either her spermatheca was crushed by the compression, or severed from the oviduct; or she was thereby deprived of the use of the muscles connected with the parts.

This occurrence subsequently induced Dr. Dönhoff to make an experiment, to ascertain whether the same effect could be produced by intentional mechanical compression of the rings of the abdomen. The queen thus operated on, though previously producing worker-eggs, thereafter produced drone-eggs only.

This will suffice to show that queens may still be sufficiently vigorous to lay eggs, though utterly incompetent to lay any which will or can produce a worker.

PROPOSITION 12. As some unfecundated queens occasionally lay drone-eggs, so also in queenless colonies, no longer having the requisite means of rearing a queen, common workers are sometimes found that lay eggs from which drones only proceed. These workers are likewise unfecundated; and the eggs are uniformly laid by some individual bee, regarded and treated more or less by her companions as their queen.

1. *In queenless colonies, workers sometimes occur which lay drone-eggs.*

This is no longer doubted or denied by intelligent apiarians who have had ordinary experience in bee culture, and have properly used the opportunities for observation which they have enjoyed.

2. *But drone-egg-laying workers are found only in colonies which no longer possess the requisite means of rearing a queen.*

There may be some rare exceptional cases, but ordinarily this is true. In colonies which have no queen, but have worker-eggs, unsealed worker-brood, or larvæ in royal cells, no drone-eggs are laid. In colonies which remain or become queenless after sending out a swarm, and in swarms which become queenless, drone-eggs are not laid immediately after the loss or deprivation has occurred, even though they ultimately become drone-producing stocks. Generally some considerable time elapses before drone-egg-laying begins, as will be shown when considering the next proposition.

3. *The eggs laid by fertile workers produce perfect drones.*

I firmly believe this, because the drones thus

produced, precisely resemble, in every respect, those bred in colonies having fully fertile queens. I have no direct and positive evidence to adduce, indeed, though I can indicate a process by which it may be ascertained whether they really possess the attributes of virility. So soon as it is observed that a queenless colony contains drone-eggs or larvæ, let the combs be taken out successively, brush off the bees into a suitable box, immerse them in water, and carefully pick out all the drones, so as to be sure that all those which may have been hatched from eggs laid by their late queen are removed. Then replace the combs in the hive and return the bees after they have become dry, adding to them, if they be few in number, a reinforcement of workers taken from some other colony, and carry the hive to some isolated location, where neither wild nor domestic bees are found. Ere many days, drones emanating from eggs laid by a fertile worker will make their appearance in the cells. Now take out the combs again, brush off the bees, return the combs to the hive and introduce in it an unfecundated queen with a suitable number of workers, from among which all drones have been carefully removed. Then immerse in water the bees which were brushed from the combs, pick out the drones and place them in the hive containing the unfecundated queen. Confine and carry away the immersed workers. Leave the hive in its isolated location; and if under these circumstances the queen becomes fully fertile—that is, capable of laying worker-eggs, then the perfect virility of drones hatched from eggs laid by fertile workers, will be at least *highly probable*. I say highly probable, for it would still not be absolutely certain, because various unanticipated casualties or occurrences may throw doubt on the reliableness of the result, and render a repetition of the experiment, under more favorable auspices, necessary or desirable.—I would suggest to beekeepers favorably situated, to institute such an experiment for their own satisfaction and for the elucidation of the truth.

4. *The drone-egg-laying workers are not fecundated.*

Prof. Leuckart dissected a large number of fertile workers sent to him by Dr. Dönhoff and myself, and though he found perfectly formed eggs in the ovarian tubes of all of them, the spermatheca in each was merely rudimental and so imperfectly developed that it required the aid of a microscope to detect it, and contained no trace of sperm or seminal matter. It was thus clearly demonstrated that these bees were neither fecundated nor susceptible of fecundation. Prof. Von Siebold, who likewise dissected some fertile workers, and fully corroborated the statement of Prof. Leuckart, remarks that "the peculiar structure of the worker's abdomen precludes concourse with the male."

5. *The drone-eggs found in queenless colonies are all laid by one individual.*

This may not be universally true; but according to my observations, it is generally the case. Last September, I divided a queenless drone-producing colony into two nearly equal parts. Eggs continued to be laid in only one of them.

6. *The bees of the colony regard and treat the fertile worker more or less as their queen.*

This is evident from the circumstance that it is, in many cases, almost impossible to detect the queenless condition of a colony from external appearances or the general deportment of the workers. These frequently will labor as industriously, carry in pollen as plentifully, and defend their hive with as much spirit and pugnacity, as if they had a healthy and prolific queen. They will neglect to rear a queen from eggs or larvæ when introduced, and reject and kill a fertile queen when offered to them. This can only be explained on the supposition that the bees regard the fertile worker as a genuine queen.

7. *The fertile workers which make their appearance in queenless colonies, are not designedly reared by the bees, but occur casually only, and must be regarded as abnormal or exceptional productions.*

They originate mainly when a colony undertakes to rear young queens, especially when the old queen has been suddenly lost or removed. A number of royal cells are then hastily started, and some of them afterwards abandoned, the larvæ having meanwhile fed with royal jelly. The development of the sexual organs, and more especially of the ovaries, is thus probably stimulated, and though supplies of such nutriment are subsequently withheld, the capacity to lay eggs more or less freely has been conferred. I have frequently marked the worker-cells thus incipiently transformed, and know that they were reconverted to their original form and character, their inmates being again treated like simple worker-larvæ as at first, though I saw that royal jelly had been lavishly introduced. Such cells may readily be distinguished even after their reconversion, as the bees cap them with a broader and more convex cover than ordinary worker-cells.

Huber conceived that workers reared in the vicinity of royal cells, may occasionally receive a portion of the royal jelly, and thus be stimulated to fertility. Dzierzon concurs in this view, in so far as it may account for the production of fertile workers in some instances; but believes also that they may and do originate in various other modes.

Every hypothesis, however, yet submitted from any quarter, rests chiefly on the assumption that development has by some means been over-stimulated for a brief period; and as the result affects the sexual organs more especially, the quantity and quality of the food administered have been looked to as the exciting cause.

PROPOSITION 13. *So long as a fertile queen is present in the hive, the bees do not tolerate a fertile worker.* Nor do they tolerate one while cherishing the hope of being able to rear a queen. In rare instances, however, exceptional cases occur. Fertile workers are sometimes found in hive *immediately* after the death or removal of the queen and even in the presence of a young queen, *so long as she has not herself become fertile.*

On the 17th of July, 1852, the young queen reared in a colony from which a swarm had issued was lost; and on the 18th another colony in similar circumstances lost its queen. The first was in a common straw hive, from which the combs could not be lifted. On the 29th of July, I cut them out and found neither eggs nor larvæ in the cells. I transferred the bees to a small hive furnished with combs in frames, and on the 9th of August, eggs were seen in the cells—being twenty-three days after the queen was lost.

The second colony was in a movable comb hive. I examined the combs on the 29th of July, but found no eggs; nor could any be discovered on the 9th of August; but on the 20th, the cells contained a number of larvæ. Here, five or six days more must have elapsed, than in the first case, before egg-laying began.

I might cite a number of other instances showing, like these, that usually egg-laying by fertile workers does not commence till some time after the bees cease to cherish the hope of rearing a queen.

I have, however, one instance showing that a fertile worker must have commenced laying at an earlier period, and have continued it for some time after the bees had begun to rear a queen. On the 29th of May, 1853, I drove out a swarm from one of my hives, and twenty days thereafter sealed drone-brood was found in the parent hive, which emerged on the thirty-third day after the driving. But on a further examination of this hive on the same day, I found a fine fertile queen, plenty of eggs, and some newly hatched larvæ. Allowing twenty-four days for the development of a drone, the drone-eggs must have been laid within nine days after the driving; and, as it would seem, several days after the bees had begun to rear a queen, because the worker-larvæ selected for that purpose must have been in a cell not yet sealed, when the transformation was undertaken. This, indeed, cannot but be regarded as an exceptional case, but it shows that a fertile worker may commence laying almost immediately after the loss or removal of the queen, and may be continued during the rearing of another, and probably till the one so reared has herself become fertile.

WORKERS SHORT-LIVED.

The age to which worker bees *may* attain is not easily ascertained, and opinions differ widely respecting it. But since the introduction of the Italian bee, we may readily determine how old they usually get to be. If the native queen of a common stock be removed about the middle of May, and a fertile Italian queen substituted, we shall scarcely find one common worker among a thousand on examining the colony about the first of August ensuing. If the substitution be made about the end of July, the proportion of common workers remaining at the end of October will be about one-fourth or one-fifth of the whole number. It is, hence, evident that the duration of life in the case of workers, is greatly dependent on the season. When forage abounds and bees are industriously gathering stores, their span of existence appears to be comparatively short; and we may estimate that during the height of the honey season, they do not, on the average, live longer than five or six weeks; though they perish more from accident and exhaustion than from actual old age.

☞In order to ascertain what influence the *size* of the cells exerted on the development of the larvæ reared in them, Huber selected a drone comb containing eggs and larvæ, all of which he removed, replacing them with worker larvæ one day old. This comb, thus prepared, he inserted in a hive containing a healthy queen. The bees at once took charge of the brood, and in due time capped the cells with covers nearly flat, and entirely different from those of drone cells. Eight days after the capping he took out the comb and examined the brood. They proved to be worker nymphs, more or less advanced to maturity; but entirely similar, both in form and size, to such as are bred in worker cells. From this he inferred that the size of the cell does not, of itself, determine the sex, as Knauff and others had alleged.

☞ The Austrian bee-keepers estimate that bees need as much honey to carry them safely from Candlemas to spring, as was required to support them from the preceding fall to Candlemas.

Bee Culture in Common Hives.

No. I.

BY F. W. GUNDELACH.

There is scarcely any topic on which so many treatises have appeared as on the management of the honey bee, that useful and interesting insect, which man in the earliest periods of history withdrew from its native forests and partly domesticated.

It would seem, therefore, hardly possible to add anything new or useful to the collective mass of observations and facts already treasured up in those numerous publications. Yet I conceive that, from my own experiments and experience, I have gathered some results not generally known, and which are of substantial value in rendering bee-keeping profitable—as a comparison of my apiary with others in my neighborhood, has for years past conclusively shown. My present purpose is to elucidate specially only those points, with but brief incidental reference to aught beside.

Many persons are of opinion that no artificial processes are admissible in bee-culture; and that the best results are attainable only by him who simply cleanses the bottom board of his hives in the spring, feeds such of his stocks as appear to need it, hives the swarms when they naturally issue, and in the fall brimstones the heaviest and the lightest. I am of a different opinion, and can adduce a striking example that a more scientific management will insure greater and more certain profit.

In the year 1838, having sold my gardens, I removed my bees to the premises of my brother-in-law—an admirably adapted location. I placed my apiary only four yards distant from his; and it so happened that we then had each the same number of stocks, viz: *nine*. My brother-in-law devoted much time to his bees, but managed them according to the above-mentioned simple method. I, on the other hand, invariably drummed out the first swarms, and treated my bees according to the teachings of my previous experience. The number of my stocks increased from year to year, so that when, after the lapse of four years, I again purchased ground for a garden, I was prepared to establish a second apiary there, which gave me the advantage of being able to place my forced swarms at a distance from the parent hives. In the spring of 1847, my brother-in-law had only one feeble stock remaining, which soon after perished; whilst I increased my stocks that year from sixteen to forty-two; and in the fall of 1851, they had been multiplied to more than ninety—having yielded yearly also an ample supply of honey and wax.

APIARIES AND HIVES.

The best position for an apiary is one fronting the southeast. It should be so placed that the flight of the bees is not obstructed; though this is not absolutely necessary, as they will always manage to find their hives. It is better to locate an apiary in a valley than on high ground, that when the bees are returning heavily laden they may be saved from a toilsome upward flight. Yet they may properly be placed in the upper story or even in the roof of a house situated in the valley; because the bees, when returning, rise high enough in the air to *clear* any trees or other high objects in their course, and descend only when they arrive in the immediate neighborhood of their hives. But it is not proper thus to place stocks intended for natural swarming; because, the swarms are then apt to alight in places difficult of access, and are also more prone to make their escape to the woods. I have, however, often placed swarms, after hiving, in a garret, and they labored there with remarkable industry.*

It is an advantage, where an apiary contains several stories, that each of these be sufficiently high to admit of one hive being placed on another. This is very desirable, both when forced swarms are to be made, and when two or more stocks are to be united.

As respects the hives themselves, I regard those as the best which are composed of straw rings or sections, each twelve inches in diameter and four inches high. These facilitate the removal of the surplus honey, as the upper section may easily be separated or cut off by means of a thin wire. The top or cone may then be replaced, and the honey obtained will generally be found nearly pure or free from pollen. If the removal be deferred till about the end of September or beginning of October, when the nights are cool, very few bees, if any, will be found in the section removed, especially if it be done early in the morning. If it be intended to preserve the section with its contents till the ensuing spring, to be then given to a forced swarm as an *outfit*, it will be well to shift it halfway round after it has been severed by the wire.

* "*Remarkable Industry.*"—If this is correct, *why* is it so? It is well known from experience that hives occupying an isolated position, are pre-eminently industrious, and thrive particularly well. It seems, also, to be contrary to nature to congregate a large number of stocks in close proximity, at the same elevation, and all fronting in one direction. When the construction of the hives, and other circumstances admit of it, the stocks should be distributed as far apart as possible. Hence, it is *not the elevation* at which a stock is placed, but the *isolation of its position*, that confers the advantage. B.

so that the combs may cross each other; and let it remain thus a day or two. The bees will immediately lick up the honey from the disrupted cells and store it elsewhere; and though they will also reunite the combs where they touch each other, a separation is readily effected again, by prizing the sections asunder with a chisel. When drawing the wire through between the sections to cut them apart, care must be taken to draw it *transversely* through the combs, and if possible, with an equal strain on each—as a lateral application of the wire would be apt to compress the combs against each other, and force much of the honey out of the cells. If the combs run from front to rear, as is generally the case, the wire must be drawn from the front to the rear, or from rear to front.

Hives composed of straw rings or sections, possess this important advantage also, that space properly suited to the size of each swarm can be given to it—if weak, giving it only two sections, or only one when necessary. If a swarm be put in a hive too large for its numbers, it will be unable to maintain therein the requisite degree of warmth; its combs will be irregularly built, and it will increase very slowly. Finally, these composite hives, have this good quality likewise, that a section may be removed from below, in the spring, thereby confining the bees in a smaller space, and thus keeping them warmer.*

As second best, I regard *entire* straw hives one foot in diameter, and fifteen inches high. The first twelve inches should be uniform in diameter, and thence the top be regularly arched, with a hole 2½ inches wide in the apex. Each hive should have a wooden hoop around its base.

I do not consider wooden hives as so serviceable, since they do not afford so good protection against cold, as straw hives—the straw enclosing much air, which is a bad conductor of heat, and hence the interior heat, produced by the bees cannot so readily escape. Wooden hives also contract much moisture in winter, causing mouldiness of the combs, and otherwise disagreeably affecting the bees. Besides, wooden hives rarely fit so closely to the bottom board, as straw hives do.

* In the use of straw hives, I likewise prefer those which are divisible, but I would recommend sections fourteen inches in diameter, and eight inches high. Three such sections will form a hive, and surplus honey is procured from such stocks, y adding *scaps* or *supers*, or by placing in the rear a hive or box having a covered communication with the main hive. The removal of sections from above and replacing them by others inserted below, I do not approve of. When supers are to be used, the covers of the hive should be flat, with a hole 3½ inches in diameter in the centre. If a thin board of the same size with the cover and a corresponding hole be first placed thereon, and the super set on it, this may be removed in the fall, after a cool night, without disturbing a bee. But annexing a hive in the rear, is the preferable process. Swarming may, however, be more readily prevented by adding a super than by placing a hive in the rear. B.

[For the "Bee Journal."]

In the *Bee Journal* for March, page 66, is an article from the Rev. L. L. Langstroth, giving an account of an ocular demonstration by Messrs. Cary and Otis, of the copulation of the queen and drone-bee, which I can hardly endorse as correct. The position of the two, the drone clasping the queen around the body, &c.

The Author of Nature has so arranged the genital parts of the drone and queen, that it is physically impossible to make their genital parts meet, with the drone on the back of the queen. They must be reversed, and the queen clasping the drone with her legs, and driving the drone down in close contact with her body, with a quick motion the genitalia are thrown out into the vulva of the queen, by which means the copulation is accomplished—which it is known that the queen could not do if disabled in her legs or wings.

I will give my experiments on the subject. Some years since being desirous of learning in what manner the copulation between the drone and queen was accomplished, it occurred to me that by examining the sexual organs of the queens and drones, I could satisfy myself, by seeing how the Author of Nature designed them to be put together. I obtained drones and by a gentle pressure between the thumb and finger, it would cause them to throw out their genitalia, which curve over towards the back or head with a joint about one-third of the length from the end, which end curves downwards with double barbs at the under side at the joint, and is composed of a very thin membrane, and filled with compressed air, and the semen also thrown up (that was contained in the two horn-shaped sacs situated at the base of the genitalia,) with sufficient force to burst the end, and the semen is thrown out, leaving the inside casing of the sac, which is held by a thread-like tendon, attached at the base, the same as animals after giving birth to their young. On my theory, the workers that attend the drones on their excursions cause them to give off semen, which they convey to their hives to perfect queens, and also accounts for cause and use of so many drones, as they expire immediately on giving off their semen. Any one doubting the above experiments and results, will please communicate any experiments of theirs going to disprove the correctness of my position.

E. KIRBY.

Henrietta, N. Y., June, 1861.

☞Bee culture can only be regarded as truly "the Poetry of Rural Economy," when it is prosecuted not merely as a source of pecuniary profit, but also as a perennial fountain of intellectual enjoyment.

[For the "Bee Journal."]

I respectfully beg leave to say a few words to my beekeeping friends, through the *American Bee Journal*, in regard to comb guides, as that is a subject of vital importance to every one who attempts to keep bees on the more scientific principles of the present age.

And also being myself a zealous advocate of the movable comb class of bee-hives, I have been greatly gratified and pleased with the articles brought out already by our valuable "Journal" on the subject of comb guides.

I have used for three seasons, strips of comb stuck on the upper or top piece of the frame as a comb guide, and I am so highly pleased with the plan that I cannot refrain from giving my experience to others whom it may concern, as I believe that articles from practical men, in the cultivation of bees, is the way in which the science of apiarian pursuits will be most speedily advanced, bringing beekeeping to a more firm basis than it has heretofore occupied in our country; for I have full confidence in the inventive genius of our American citizens.

I also believe that if our energies are rightly directed that ere many years this country will stand out as prominent in beekeeping as she does in many other things.

Our advance already in bee hives reminds me strongly of the language of our late Commissioner of Patents, in regard to inventions, that "No sooner are the American people informed that a certain improvement in anything is wanted, than some man steps forward with the very thing needed."

But, to the subject we started on. The way I proceed is this: take some pan or skillet, and melt in it rosin and beeswax in the proportions of two parts of rosin, and one part of beeswax. Your vessel ought to be eight or ten inches wide, to give room for slipping in the comb.

Then select fine meshed brood comb, having ready a sharp knife; oil the blade of the knife, so that it will pass through the comb without clinging to it, first having the comb at the proper temperature, that it will not break. You must also see that you have not your comb too warm, or it will be easily mangled. When things are all right, your knife will slip through the comb very perfectly, leaving the strips straight and in good order. Your strips ought to be about three-fourths of an inch wide. Have the top piece of your frames flat; then slip the strips of comb in your melted wax, and set them straight on the frames, and they will stick tight almost as soon as they touch, so that you can set each frame away as fast as it is fixed.

When you have things all in a state of readiness, you can fix a set of frames in a few minutes, and then you have, I think, the best comb guide that can be used almost, for several reasons. In the first place, you have given the bees a start of the right kind of fine meshed comb, worker-brood comb; again, you have a comb on or in each frame, as straight as a rule, which is a very desirable thing.

Then the animal heat of the hive is not absorbed or hindered by partitions of wood or metal between the combs, which new natural swarms dislike very much; and you economize the use of the old or waste combs about your bee yard.

I used this method of comb guides last season in about fifty hives, and I do not think that I had one crooked comb in the lot.

I am certain that if that kind of comb guide is properly put on and used, that you will attain to a very high perfection in straight combs—in fact, almost all that a person could wish or desire.

FLEMING MCCONNELL.

[For the Bee Journal.]

MR. EDITOR.—In response to a request from J. F. L., in the *Bee Journal* of June, "stating as a farther help towards a solution of the second query, if beekeepers who have large hives that might have contained old honey, would communicate their observations on this point through the *Bee Journal*, we might perhaps, after a while, arrive at some definite conclusion."

Now, I would simply state, that in the winter of 1859 and 1860, I wintered five swarms of bees, from which, during the season, I obtained ten young swarms, which I hived in ordinary box-hives with drawers in top. The most of them apparently did well, and one of them took the first premium at the County Fair. When winter set in I removed them to the south side of the house under the stoop; supposing they had honey enough to keep them, I paid no more attention to them until January, when on looking, four of them had died, together with two of the old ones, and the other five just alive, without a particle of honey left; the remaining five I fed a few days, when they died also. The three old hives remaining had about thirty pounds of honey each from 1859, and had a good supply still, this spring, and are now doing well. I should infer from what was said about dysentery, that my bees had it, they would discharge their fæces all over the hive, inside and outside, also on the comb, some of which grew mouldy and very offensive to the smell.

Canoga, N. Y., June 18, 1861. B. F. B.

☞ *Please send us the names of beekeepers.*

(For the "Bee Journal.")

The following, I believe to be the true history of the reproduction of the honey-bee, as instituted by the wisdom of the Creator.

1st. The workers in their flight with the drones alight on the drones' backs and cause them to give off their semen, which the workers lick up and carry to their appropriate cells in their hives, for the purpose of propagating the young queens. See what nature has done to accomplish that design, in so constructing the drone, that by a slight pressure of the abdomen, by the legs of the worker or queen, (or the fingers) to throw out the genitalia—if the worker is clasping the body, it being physically impossible to enter the body of the worker, and by a joint in the genitalia towards the end it passes near the back of the drone and bursts, giving off semen which is held by the barbs at the joint, and the drone instantly dies, leaving the worker to obtain the semen. In this, the drone is like some plants, when ripe; with a slight pressure, the seed vessels explode and throw off the seed.

How the queen obtains semen in her spermatheca is not known, except that the queen occupies the top instead of the bottom in her copulation with the drone. The above theory shows the use and wisdom of God in causing so many drones at times, and the mystery made plain in the perfecting of queens in the absence of drones, by the impregnated worker-larvæ with semen. The worker takes the semen thus obtained, and impregnates the embryo worker-larvæ in royal cells, which fecundates the ovary of the immature queens, in order to give life to her drone progeny. She then comes forth fully prepared to lay eggs that produce drones only. She must fly out before becoming fully fertile and a perfect queen, and have a connexion with the drone and her spermatheca filled with semen, in order that she may be able to impregnate the drone eggs, as they pass her spermatheca, and the eggs so impregnated produce the workers, and from the worker-larvæ, after being impregnated with the drone semen procured by the workers, produce the queens. Dzierzon and Prof. Von Siebold in their theories as to the production of drones by parthenogenesis—that is without the male sperm—are not giving the true history; and had the truth relative to the fecundating of the ovary of the immature queens been understood, the naturalist would never have yielded the point that the drone might be produced without the male sperm; for it is well known a portion of the animal secretion remains in the royal cells after the queen leaves, and her ovary is fully fertilized for the production of drones.

The Rev. Mr. Kleine and others could not explain the phenomenon of hybridizing between the Italian and common bee; but everything relating to this subject is easily and satisfactorily explained by my theory.

A. KIRBY.

Henrietta, N. Y., June, 1861.

[For the "Bee Journal."]

Ed. Bee Journal.—Last summer I purchased a colony of bees in a common box-hive, to try my fortune in beekeeping. About the middle of August, I got it transferred to one of Langstroth's movable frame hives, and they did well.

Some time near the first of October, I divided the swarm, and so made two of them. Not getting them evenly divided, however, one proved to be very weak; and as it was very late, that one did not make honey enough to keep it the following winter. Consequently, as I neglected it too long before I examined it, I found them all dead. The other hive was strong and wintered well, and this spring have worked well, gathering both pollen and honey, as much as I could expect, seeing the spring has not been very favorable. About the 18th or 19th of May, I went to look at them, and found a quantity of dead bees, and now and then some dead brood, in front of the hive, which surprised me much; and on each succeeding day I found more dead bees. On the 21st, I opened the hive and found plenty of brood in various stages of both workers and drones, and considerable honey, but not a single royal cell could I find; and then I found that the bees were killing off their drones (the dead bees being all that kind). I wish to know if this is common. Also, if anything can be done to induce them to multiply colonies, as I wish to increase my stocks; or whether it would do to divide them. Any information through the *Bee Journal* will be gratefully received by an inquirer after truth.

A. A. COLE.

Flowerville, May 25th, 1861.

M. DE GELIERE says he frequently had colonies which being unduly supplied with drone comb, produced a greatly disproportioned number of drones. He caught and killed more than five thousand drones, on one occasion, from a single hive. When flying, they appeared to be more numerous than the workers. Though really largely in the minority, they produced vastly more noise and confusion.

☞Though I am decidedly in favor of full liberty of speech, I am of opinion that, in reviewing the opinions of others, we ought to use this liberty with the utmost circumspection. We should, according to an ancient sage, "have the tongue in the heart, and not the heart on the tongue," lest by hasty and inconsiderate expressions, the feelings of others be wounded.—DZIERZON.

☞*Please send us the names of beekeepers.*

(From the "London Quarterly.")

The Honey Bee.

(FIRST MODICUM.)

How the little busy bee improves each shining hour—makes hay when the sun shines—makes honey, that is, when flowers blow—is not only a matter for the poet and moralist and the lover of nature, but has become an important subject of rural, cottage, and even political economy itself. If West Indian crops fail, or Brazilian slave-drivers turn sulky, we are convinced that the poor at least may profit as much from their bee hives, as ever they will from the extracted juices of parsnips or beet-root. And in this manufacture, they will at least begin the world on a fair footing. No monopoly of capitalists can drive them from a market so open as this. Their winged stock have free pasturage—commonage without stint—be the proprietor who he may, wherever the freckled cowslip springs and the wild thyme blows. Feudal manors and parked royalties, high deer-fences and forbidding boundary belts, have no exclusiveness for them; no action of trespass can lie against them, nor are they ever called upon for their certificates. But if exchange be no robbery, they are no thieves; they only take that which would be useless to all besides, and even their hard-earned store is but a short-lived possession. The plagiarist Man revenges himself for the white lillies they have dusted and disturbed, and makes all their choicely-culled sweets his own. But though he never tasted a drop of their honey, the bees would still accomplish the work that Providence has allotted them in fructifying our flowers and fruit-blossoms, which man can at best but clumsily imitate, and in originating new varieties which probably far surpass in number and beauty all that has been done by the gardening experimentalist since the days of Solomon. Florists are apt to complain of the mischief the bee does in disturbing their experiments and crossing species which they wish to keep separate; but they forget how many of their choicest kinds, which are commonly spoken of as the work of chance, have in reality been bee-made, and that, where man fructifies one blossom, the bee has worked upon ten thousand.

It is certain, however, that the great interest taken in bees from the earliest times, and which, judging from the number of books lately published, is reviving among us with no common force, has arisen chiefly from the marked resemblance which their modes of life seem to bear to those of man. Remove every fanciful theory and enthusiastic reverie, and there still remains an analogy far too curious to be satisfied with a passing glance. On the principle of "*nihil humani a me alienum*," this approximation to human nature has ever made them the favorites of their masters. And theirs is no hideous mimicry of man's follies and weaknesses, such as we see in the monkey tribe, which to us has always appeared too much of a satire to afford unalloyed amusement. Their life is rather a serious matter-of-fact business, a likeness to the best and most rational of our manners and government, set about with motives so apparently identical with our own, that man's pride has only been able to escape from the ignominy of allowing them a portion of his monopolized Reason, by assigning them a separate quality under the name of Instinct. The philosophers of old were not so jealous of man's distinctive quality; and considering how little at the best we know of what reason is, and how vain have been the attempts to distinguish it from instinct, there may be, after all, notwithstanding the complacent smile of modern sciolists, as much truth as there certainly is poetry and charity in Virgil, who could refer the complicated and wonderful economy of bees to nothing less than the direct inspiration of the Divine Mind.

Bees, indeed, seem to have claimed generally a greater interest from the ancients, than they have acquired in modern times. De Montford, who drew "the portrait of the honey fly" in 1646, enumerates the authors on the same subject, up to his time, as between five and six hundred! There are, to be sure, some apocryphal names on the list—Aristæus, for instance—whose works were wholly unknown to Mr. Huish; a fact which will not surprise our readers when we introduce him as the son of Apollo, the father of Actæon, the "peeping Tom" of mythological scandal. Aristæus himself was the patron of bees and arch-bee-master; but no ridicule thrown on such a jumble of names must make us forget the real services achieved in this as in every other branch of knowledge, by the Encyclopœdiast Aristotle—the pupil of him who is distinguished as the "Attic Bee;" or the life of Aristomachus, devoted to this pursuit; or the enthusiasm of Hyginus, who, more than 1800 years before Mr. Cotton, collected all the bee passages which could be found scattered over the pages of an earlier antiquity.

Varro, Columella, Celsus and Pliny have each given in their contributions to the subject; and some notion may be formed of the minuteness with which they entered upon their researches, from a passage in Columella, who, speaking of the origin of bees, says that Euchemerus maintained that

they were first produced in the island of Cos, though Euthronious asserted they originated in Mount Hymettus, and Nicander in Crete. Considering the obscurity of the subject, and the discordant theories of modern times, there is, perhaps, no branch of natural history in which the ancients arrived at so much truth. If, since the invention of printing, authors can gravely relate stories of an old woman, who, having placed a portion of the consecrated elements at the entrance of a bee hive, presently saw the inmates busy in erecting a shrine and altar of wax, with steeple and bells to boot, and heard, if we remember rightly, something like the commencement of an anthem—we really think that they should be charitably inclined to the older bee authors, who believed that they gathered their young from flowers, and ballasted themselves with pebbles against the high winds.

We shall have occasion to show, as we proceed, how correct in the main the classical writers are on the subject of bees, compared with other parts of natural history; but the book of all others to which the scholar will turn again and again with increased delight, is the fourth Georgic. This, the most beautiful portion of the most finished poem of Roman antiquity, is wholly devoted to our present subject; and such is the delightful manner in which it is treated, and so exquisite the little episodes introduced, that it would amply repay (and this is saying a good deal) the most forgetful country gentleman to rub up his schoolboy Latin, for the sole pleasure he would derive from the perusal. We need hardly say that no bee fancier will content himself with anything less than the original: he will there find the beauties of the poet far outbalancing the errors of the naturalist; and as even these may be useful to the learner—for there is no readier way of imparting truth than by the correction of error—we shall follow the subject in some degree under the heads which Virgil has adopted, first introducing our little friends in the more correct character which modern science has marked out for them.

The "masses" of every hive consist of two kinds of bees, the workers and the drones. The first are undeveloped females, the second are the males. Over these presides the mother of the hive, the queen bee. The number of workers in a strong hive is above 30,000, and of drones, usually about one to ten of these. This proportion, though seldom exact, is never much exceeded or fallen short of. A single family, where swarming is prevented, will sometimes amount, according to Dr. Bevan, to 50,000 or 60,000. In their wild state, if we may credit the quantity of honey said to be found in it, they must sometimes greatly exceed this number.

"Sweet is the hum of bees," says Byron; and those who have listened to this music in its full luxury, stretched the while on some sunny bed of heather, where the perfume of the crushed thyme struggled with the faint smell of the bracken, can scarcely have failed to watch the little busy musician

"With honey'd thigh,
That at her flowery work doth sing,"

too well to require a lengthened description of her; how she flits from flower to flower with capricious fancy, not exhausting the sweets of any one spot, but, on the principle of "*live and let live*," taking something for herself, and yet leaving as much or more for the next comer, passing by the just opening and the faded flowers, and deigning to notice not even one out of five that are full-blown, combining the philosophy of the Epicurean and the Eclectic;—or still more like some fastidious [illegible]ble, on a grand tour, with all the world before him, hurrying on in restless haste from place to place, skimming over the surface or tasting the sweets of society, carrying off some memento from every spot he has lit upon, and yet leaving plenty to be gleaned by the next traveller, dawdling in one place he knows not why, whisking by another which would have amply repaid his stay, and still pressing onward as if in search of something, he knows not what—though he often fails to carry home the same proportion of happiness as his compeer does of honey.

"A bee among the flowers in spring," says Paley, "is one of the cheerfulest objects that can be looked upon. Its life appears to be all enjoyment: *so busy and so pleased.*"

The drone may be known by the noise he makes. Hence his name. He has been the butt of all who have ever written about bees, and is indeed a bye-word all the world over. No one can fail to hit off his character. He is "the lazy, yawning drone" of Shakspeare. The

"Immunisque sedens aliena ad pabula fucus"

of Virgil. "The drone," says Butter, "is a gross, stingless bee, that spendeth his time in gluttony and idleness. For, howsoever he brave it with his round velvet cap, his side gown, his full paunch, and his loud voice, yet he is but an idle companion, living by the sweat of others' brows. He worketh not at all, either at home or abroad; and yet spendeth as much as two laborers; you shall never find his maw without a good drop of the purest nectar. In the heat of the day he flieth abroad, aloft, and about, and that with no small noise, as though he would do some great act. But it is only for his pleasure, and to get him a stomach, and then he returns presently to his cheer."

This is no bad portrait of the burly husband of the hive. He is a proper Sir John Falstaff, a gross, fat animal, cowardly, and given to deep potations. He cannot fail to be recognized by his broad body and blunt tail and head, and the "bagpipe i' the nose." He is never seen settling on flowers, except at the beginning of August, when he may sometimes be met upon a late blown rose, or some double flowers that workers rarely frequent, in a melancholy, musing state, as if prescient of the miserable fate that so soon awaits him. The occasion for so large a proportion of

"These lazy fathers of the industrious hive,"

is by some regarded as a yet unsolved riddle. One author fancies them to be the water carriers of the commonwealth. Some have supposed that the drones set, like hens, upon the eggs; in which case, the hair on their tails would seem to serve the same purpose as the feather breeches which Catharine of Russia had made for her ministers when she caused them, by way of punishment, to hatch eggs in a large nest in the ante-chamber. But this is mere fancy, the earwig being the only insect, according to Kirby and Spence, that broods over its eggs. Dr. Bevan denies that they are useful, or at least necessary, in keeping up the heat of the hive in breeding-time, which is the commonly received reason for their great numbers. Huber appears to have judged more accurately, when he thought so large a quantity were required, that when the queen takes her hymeneal flight, she may be sure to meet with some in the upper regions of the air.

Last in our description, but

"First of the throng, and foremost of the whole,
One stands confest the sovereign and the soul."

This is the queen bee. Her power was acknowledged before her sex was known, for Greeks, Latins and Arabs always style her "the king;" and it may be thought an argument in favor of monarchical government, that the "tyrant-quelling" Athenians and republican Romans, who almost banished the name with the blood of their kings, were forced to admit it to describe "the first magistrate" of this natural commonwealth. "The queen," says our quaint old author, "is a fair and stately bee, differing from the vulgar, both in shape and color." And it is amusing, that the most sober writers cannot speak of her without assigning her some of those stately qualities which we always connect with human sovereignty. Bevan remarks that "she is distinguishable from the rest of the society by a more measured movement;" her body is more tapering than that of the working bee; her wings shorter, for she has little occasion for flight; her legs—what would Queen Elizabeth, who would not even hear of royal *stockings*, think of our profaneness?—her legs unfurnished with grooves, for she gathers no pollen; her proboscis short, for the honey comes to her, not she to the honey; her sting short and curved—for sting she has, though she seldom uses it.

In addition to these, Huber and others have thought that they discerned certain black bees in many hives; but it is now generally allowed that these, if they exist at all, are not a different species, but individual workers which have suffered from hardship and exposure.

Having "caught our hare," got a good stock of bees, the next question is, where shall we place them? and there is little to be added to Virgil's suggestions on this head. The bee house should face the south, with a turn perhaps to the east; be protected from the north and prevailing winds; not too far from the dwelling, lest they become shy of man, nor too near, lest they be interrupted by him. No paths should cross its entrance, no high trees or bushes intercept their homeward flight. Yet, if placed in the centre of a treeless lawn, they would be apt in swarming to fly away altogether, so that Virgil rightly recommends the palm or some evergreen tree to hang over or near the hive. Another of his injunctions, which no modern writer seems to notice, is to sprinkle some neighboring branch, where you wish them to hang, with honey and sweet herbs bruised. Those who have been so often troubled by the inconvenient places in which swarms have settled, might do well to try the recommendation of the old Mantuan bee master. A quiet nook in low ground is better than an elevated situation: they have then their up-hill flight when their bodies are unburdened, and an inclined plane to skim down when they come home loaded with their hard-earned treasure. Rogers, at whose

"Cot beside the hill
A bee hive's hum could soothe the ear,"

has supposed the bee to be guided back to its hive by the recollection of the sweets it passed in its outward flight—a beautiful instance of "the pleasures of memory."

"Who guides the patient pilgrim to her cell?
Who bids her soul with conscious triumph swell?
With conscious truth retrace the mazy clue
Of varied scents that charm'd her as she flew?
Hail, Memory, hail! thy universal reign
Guards the least link of Being's glorious chain."

Whether this be the true solution or not, her return to her hive, so straight as it is, is very curious.

It seems that bees, like men, require a certain

quantity of saline matter for their health. "In the Isle of Wight, the people have a notion that every bee goes down to the sea to drink twice a day;" and they are certainly seen to drink at the farm-yard pool—

"the guilded puddle
That beasts would cough at—"

when clearer water is nearer; though the latter may be colder, and hence to them less palatable. Following the example of our modern graziers, a small lump of rock-salt might be a useful medicine-chest for our winged stock. Foul smells and loud noises have always been thought annoying to bees, and it is therefore deemed advisable never to place the hives in the neighborhood of forges, pig-sties and the like. Virgil even fancied that they disliked the neighborhood of an echo.

Next to the situation of the hive is the consideration of the bee's pasturage. When there is plenty of the white Dutch clover, sometimes called honey-suckle, it is sure to be a good honey year. The red clover is too deep for the proboscis of the common bee, and is therefore not useful to them. Many lists have been made of bee flowers, and of such as should be planted round the apiary. Mignonette, and borage, and rosemary, and bugloss, and lavender, the crocus for the early spring, and the ivy flowers for late autumn, might help to furnish a very pretty bee garden; and the linden, and the liquidamber, and the horse-chestnut, and the sallow, would be the best trees to plant around. Dr. Bevan makes a very good suggestion, that lemon-thyme should be used as an edging for garden-walks and flower-beds, instead of box, thrift or daisies. That any material good, however, can be done to a large colony by the few plants that, under the most favorable circumstances, can be sown around a bee house, is of course out of the question. The bee is too much of a roamer to take pleasure in trim gardens. It is the wild tracts of heaths and furze, the broad acres of bean fields and buckwheat, the linden avenues, the hedge-row flowers and the clover meadows, that furnish his haunts and fill his cells.

Pliny bids us plant thyme and apiastu, violets, roses and lilies. Columella, who, contrary to all authority, says that lindens are hurtful, advises cytisus, rosemary and the evergreen pine. That the prevalent flowers of a district will flavor the honey is certain. The delicious honey of the Isle of Bourbon will taste for years of the orange-blossoms, from which, we believe, it is gathered; and on opening a bottle of it, the room will be filled with the perfume. The same is the case with the honey of Malta. Corsican honey is said to be flavored with the box-tree; and we have heard of honey being rendered useless, which was gathered in the neighborhood of onion fields. No one who has kept bees in the neighborhood of a wild common, can fail to have remarked its superior flavor and *bouquet*. The wild rosemary that abounds in the vicinity of Narbonne, gives the high flavor for which the honey of that district is so renowned. But the plant most celebrated for this quality, is the classic and far-famed thyme of Mount Hymettus, the *Satureia capitata* of the botanists. This, we are assured by Pliny, was transplanted from the neighborhood of Athens into the gardens of the Roman beekeepers; but they failed to import with it the flavor of the Hymettic honey. The exiled plant, which, according to this author, never flourished but in the neighborhood of the ocean, languished for the barren rocks of Attica and the native breezes of its "own blue sea." And the honey of the Hymettus has not departed with the other glories of old Greece, though its flavor and aroma are said to be surpassed by that of neighboring localities once famous from other causes. While the silver mines of Laurium are closed, and no workman's steel rings in the marble quarries of the Pentelicus, the hum of five thousand bee hives is still heard among the thyme, the cystus and the lavender which yet clothe these hills. "The Cecropian bees," says C. Wordsworth, "have survived all the revolutions which have changed the features and uprooted the population of Attica." Though the defile of Thermopylæ has become a swampy plain, and the bed of the Cephisus is laid dry, this one feature of the country has remained unaltered.

"And still his honied store Hymettus yields,
There the blithe bee his fragrant fortress builds,
The free-born wanderer of thy mountain air."

The honey here collected used to be reserved for the special eating of the arch-bishop of the district, and but few travellers could even get a taste of it. Such was the case a few years ago; though recent occurrences must have tended to abolish the episcopal monopoly.

It has often been discussed whether a country can be over-stocked with bees. We believe this is quite as certain as that it can be over-peopled and over-manufactured. But that this is not yet the case in any extensive country, as far at least as the bees are concerned, we feel equally sure. Of course it is impossible to ascertain what number of acres is sufficient for the support of a single hive, so much depending on the season and the nature of the herbage; but nevertheless, in Bavaria only a certain number of hives were formerly allowed to be kept, and these had to be brought to an establishment under the charge of a skilful

apiarian, each station being four miles apart and containing 150 hives. This was centralization and red-tapery with a vengeance! A story is told that in a village in Germany, where the number of hives kept was regulated by law, a bad season had nevertheless proved that the place was overstocked, from the great weakness of all the swarms in the neighborhood. There was but one exception. This was the hive of an old man, who was generally set down as being no wiser than his neighbors, and this perhaps all the more, because he was very observant of the habits of his little friends, as well as careful in harvesting as much honey as he could. But how came his hive to prosper, when all the rest were falling off? His cottage was no nearer the pasture. He certainly must have bewitched his neighbors' hives, or made "no canny" bargain for his own. Many were the whisperings and great the suspicions that no good would come of the gaffer's honey thus mysteriously obtained. The old man bore all these surmises patiently; the honey-harvest came round, and when he had stored away just double what any of the rest had saved, he called his friends and neighbors together, took them into his garden, and said—"If you had been more charitable in your opinions, I would have told you my secret before,—

'This is the only witchcraft I have used;'"

and he pointed to the inclination of his hive—one degree more to the east than was generally adopted. The conjuration was soon cleared up; the sun came upon his hive an hour or two sooner by this movement, and his bees were up and stirring, and had secured a large share of the morning's honey before his neighbor's bees had roused themselves for the day. Mr. Cotton, who gives the outlines of the story which we have ventured to fill up, quotes the proverb, that "early birds pick up most worms," and draws the practical moral, in which we heartily concur, that your bed-room window should always, if possible, face the east.

☞An unsually early expulsion of the drones is not unfrequently an indication that the bees have voluntarily or instinctively discarded their old queen, and reared another; and that the combs contain sealed brood emanating from eggs laid by the latter.

☞The Rev. Mr. Göbel, one of the most experienced bee-keepers of Lusatia, a country long celebrated for its bee-culture, remarks that populous colonies, well supplied with honey and pollen, would pass the severest winter uninjured, even in *paper hives*.

(From the "Bienenzeitung.")

BOVIST OR PUCK BALL.

For the benefit of those who desire or may have occasion to employ this article, I communicate the following information: To obtain the fungus in its best condition, it should be gathered in July or August, and the larger kind having a yellowish-white or cream color should be chosen, as the small dark-brown kind is of no value. The larger kind is usually found in old pastures, meadows, and on the borders of forests, and is from four to eight inches in diameter. When gathered, it should be set in a box of dry sand and exposed to the sun to ripen properly, when it assumes an orange tinge. Before it attains a bright yellow color, it must be dried by artificial heat, or its value will be destroyed. This is done by placing it in a moderate stove heat, or in a bake-oven soon after the bread has been taken out. If properly dried it will remain spongy and soft, like spunk, and retain fire in the same manner. As this substance readily attracts moisture from the atmosphere, it should be kept in a dry place, and again specially dried in a moderate heat, before it is used.

The Italian borist, usually kept for sale by apothecaries, is said to be of superior quality—a piece as large as a hickory nut sufficing to stupify a colony of bees. Of the native borist, a piece the size of a hen's egg will be required for the purpose.

F. Nagdlburg, *Teacher.*

Schwedt, January 15, 1861.

[For the "American Bee Journal."]

ANT RIDDANCE.

We have made a very important and cheap discovery to keep ants from bees. Several years since the little red ants were very numerous in our cupboard, and we put stone coal against the end of the house opposite the cupboard, and it banished them all. We concluded it was the effect of the copperas in the coal. This spring the black ant began to annoy our bees, and we procured copperas out of the coal bank and put it around the bench legs, cleaned all the ants off of the bench, and there has not been one about the hives or bench since.

S. M. & E. S. Brigg.

Kirkwood Township, Belmont Co., Ohio.

☞Queens reared and fecundated before the middle of May, or in August and September, are said to be less prolific than such as are reared in the intermediate period.

The Italian Bee.

In February last, we obtained, through a merchant of Treviso, three genuine Italian colonies, direct from Mira.* The rude structure of the hives, the circumstances attending their transportation, the inclemency of the season, and the condition in which the colonies reached Munich, warrant us in ascribing to the yellow-barred race a remarkable degree of hardiness.

The Italian hives are about four feet long by one foot broad and deep, composed of half-inch boards roughly nailed together. One end of each was closed by a square piece of board, and the other was entirely open, serving for an entrance *in its whole extent.* In hives so rude, thin, and fragile, with the open end protected during the transit simply by a piece of woolen cloth drawn over it, these colonies (one of which was a weak second swarm,) arrived at Munich in a sound and healthy condition, after a long journey in a severe winter.

The hives were full of combs, built in an exceedingly irregular manner. As, in order to transfer the colonies to Dzierzon hives, it became necessary to break up these boxes entirely, the combs were, unavoidably, so damaged that it was impossible to arrange them satisfactorily at once in the new hives, the operation had to be repeated a few days later, when some new straight combs were substituted for a portion of the old ones. During this process, we had constant occasion to remark and admire the docility and gentleness of the bees. One of the colonies (a strong old stock,) contained a considerable surplus of honey, and though it was stored in old and dark combs, it was of a beautiful clear amber color, and peculiarly dense and tough, though not at all candied—resembling fine old turpentine in consistency. It was also much superior in flavor to common honey. These properties and peculiarities are, doubtless, attributable to the kind of pasturage from which it was derived.

Each of the three colonies *contained brood* so far advanced as to be sealed over in the cells. Not an egg could be found; the queens having, doubtless, ceased laying during their cold and protracted journey. They soon showed that they were fully reconciled to their new tenements, and displayed great activity and energy. Before the middle of March they began to build new combs, but in the advance made by them respectively there was more difference perceptible than could properly be accounted for by the apparent difference of the population of the several colonies. The strongest colony lagged much behind the next weaker one, both in comb-building and in the production of brood; but as this difference rapidly disappeared as the external temperature rose, it was, doubtless, the result of the difference in the warmth of their respective hives. The stronger colony had been placed in an ordinary Dzierzon hive made of poplar wood, and the top was shielded by a piece of board and an old blanket, so that it was probably as warm and comfortable as such hives usually are, especially as it was under cover in an apiary, and sheltered from the wind. The weaker had been put in a hive made under my father's direction, of one-inch linden boards, lined with stout straw matting, thus combining warmth with cheapness. Before the middle of April, this colony had built more than 325 square inches of new comb, and could supply brood to strengthen the third colony. The superior warmth of the straw-lined hive had doubtless caused the marked difference in the progress of these two colonies: for, after the weather became warmer, it became manifest that there was no difference in the fertility of the two queens.

But a much greater difference was seen between the progress of these colonies and that of our common bees. The latter did not begin to build comb before the end of April; and lest it be thought that the Italian bees had been especially cared for, I may say that whatever feeding with honey or meal was deemed necessary, was done in the open air; so that all our bees had access alike to what was furnished. Our domestic bees, being much the more numerous party, ought to have profited most by the opportunities enjoyed.

If the Italian race is distinguished for an earlier awakened impulse to activity and labor, it is remarkable also for visiting and foraging on many kinds of flowers and blossoms on which common bees are rarely, if ever, seen. Thus, the *Atabis Alpina*, (Alpine Rock-cress,) a very early blooming plant was frequented almost exclusively by the Italian bees. They also showed their superior agility and advantage in self-defence, and in repelling the attacks of robbing-bees. Nay, they would not tolerate the presence of other bees on combs which had been strewed with rye-meal for their common use. In all these particulars the palm of superiority must be conceded to them.

I will take the occasion to remark that Italian queens cannot, by the insertion of drone combs in their hives, be induced or constrained to lay drone

*Mira is a village, situated about midway between the cities of Venice and Padua. Dzierzon obtained his Italian bees from Madame de Prollius, of this village, who wrote to him for a model of his hives.

eggs much in advance of the period indicated by their own instincts and that of the workers. In the first place, the latter appropriate every vacant spot or corner, filling it with worker or brood combs, and using the drone combs exclusively for storing up honey; and, in the second place, the queens will deposit eggs in the poorest kind of worker comb, or wait patiently for the construction of new, rather than commence laying drone eggs prematurely. Nor will the bees apparently allow themselves to be diverted to any appreciable extent from the course seemingly prescribed by nature, either by abundant supplies of diluted honey, or by the increased warmth of their hives. With us, drone brooding did not begin till the weather became mild, especially at night, and a rapidly growing population admonished the colonies to prepare for swarming. Would it indeed be well if the habits of these insects were less unyielding? Should we not then have to refrain from feeding our stocks in the spring? And might not even kindly-meant protection from cold sometimes lead them into fatal mistakes? Should we not thus by the premature production of drones put at hazard the existence of the colony, or, at least, at times sadly interfere with its prosperity? But the undepraved and unaccommodating instinct of these bees guards them against such misfortunes. Hence, though I inserted drone-combs between the brood-combs before the end of March, and fed my colonies diligently, I saw no drone eggs before the 18th of April. As our common stocks do not yet contain any, we look forward with confidence to a satisfactory multiplication of the pure breed this season.

OTTO RADLKOFER, JR.

Munich, April 30, 1856.

☞On the 2d of February, 1845, an avalanche of snow fell upon and buried the apiary of the Rev. Mr. Imseng, of Lens, in Switzerland. With great labor he managed to recover all the hives, but one, which lay under a deep and dense mass of snow. At the end of March, the snow having gradually melted away, the top of the hive began to make its appearance, and he then carefully dug out the long missing stock. To his surprise he found the bees well preserved, and they throve better next season than any other colony on his stand. Might not bees be thus safely and conveniently wintered in northern districts, where snow falls deep and remains long on the ground?

☞Premature or inopportune sprinkling has sent many a swarm back in haste to its parent hive—or off into some "bosky bourne," beyond recovery.

[For the "American Bee Journal."]

REVIVING BEES.

I received the "American Bee Journal" for February. The article headed "CHILLED BEES," saved one swarm of bees for me; hence, I thought I was in your debt one dollar at least. I will tell you the circumstances: I had a swarm of bees that had to be fed this spring. I kept close watch and fed it every day with candy; but business kept me away one day longer than I had expected, and next morning when I went to see my bees, behold, they were dead. I commenced brushing them to the ground, but then the though struck me that I had seen an article on *chilled bees* in the "Bee Journal." I went and examined, and found that they could be brought to. I gathered the bees that I had brushed on the ground, found the queen and laid her on the top of a hive, then placed the rest of the bees with her, and set a glass box over them. In five minutes the queen and all the bees were alive; and they are now as good a hive as I have in my apiary of over forty swarms. I enclose one dollar in gold; please send me the "Journal," commencing with the January number. If you would send me an extra once in a while, I would dispose of it to advantage.

W. H. FURMAN.

Cedar Rapids, Iowa.

BEE FEED.

Dr. Alefield suggests that in districts where the *Agrostis stolonifera*, or common *couch grass*, abounds as a troublesome weed, it might, with little trouble, be got rid of, and at the same time made useful to beekeepers. Let the ground be ploughed in dry weather, the roots of the grass harrowed out, gathered, washed in running water, dried and preserved till the following spring. Then cut them up small, or *chaff* them in a common straw cutter, and boil them in water to extract the saccharine matter with which these roots abound. Drain off the liquid and boil it down to the consistence of syrup, and use the inspissated decoction to feed bees at the approach of spring. He conceived this would be the cheapest mode of procuring bee food when couch grass infests the soil; and that it would furnish supplies well adapted to carry bees safely through intervals of the season in summer when pasturage is scarce.

☞Intending to introduce a queen in a colony, Dr. Dönhoff stupefied the bees with the fumes of tobacco. The workers revived, with the exception of about one hundred. The drones, nearly a thousand in number, were killed by the operation.

(For the "Bee Journal.")

The answers you furnished on page 99 of "Bee Journal" for May, to questions which I proposed, are not quite satisfactory to my mind; and do not, as it seems to me, harmonize perfectly with the results of an analysis of royal jelly by Dr. Dönhoff, at page 36 for February. His report shows that his experiments were conducted scientifically, and with great care, and are therefore entitled to confidence.

In answering my questions in the May number, you say, "The error of our correspondent consists in supposing or assuming that drone sperm and royal jelly are both animal secretions, and substantially identical, whereas the former alone is an animal secretion, &c."

Dr. Dönhoff finds that the royal jelly contains animal albumen and fibrine, and their presence shows that the jelly is an animal secretion; and he further states that jelly is never found in the stomach of the bee. This decision goes to confirm an opinion of mine, published two years since, that the royal jelly is an animal compound possessing transforming and impregnating powers. It seems to me to be established beyond a doubt that the royal jelly is an animal secretion, and I shall wait with great interest for further proof to the contrary.

The royal jelly, you remark, is produced by a partial digestion in the chyle stomach of the worker, serving the purpose of nutrition, and adapted to no other purpose. This seems to me to be an error, and Dr. Dönhoff makes it clearly so. In his analysis he says, that royal jelly is never found in the stomach of the bee, and what you conceive to be the jelly is that part which goes to support nature in the growth of the larvæ, and is that food taken into the gullet or crop, is there brought into contact with the softening influence of the saliva or mucous, and is then disgorged as a nutriment for the young larvæ of the different sexes, (with the addition of semen to perfect the larvæ designed for the queen.) The same is the case with the pigeon and canary bird in preparing food for their young; and we might as well assume that the pigeon throws up partially digested food from its gizzard for its young, (which is an impossibility,) as to say that royal jelly is partially digested food in the chyle or second stomach of the worker, and disgorged for the use of the royal larvæ, which is also physically impossible. I shall leave this point for you to settle with Dr. Dönhoff, when he says it seems probable that the jelly may be found in the gullet of the worker. This being the case, the workers would always be able to perfect queens, while on the contrary it is a well-known fact that workers cannot always perfect queens when furnished with everything necessary for that purpose except semen.

You may say that animal and vegetable albumen are nearly identical. I admit it, but do not doubt Dr. Dönhoff's knowledge as to what kind it was that he analyzed. You invite me, if in possession of any scientific investigations exhibiting different results, to communicate them for publication: to this I would say, the Author of Nature, who gave to bees the laws of instinct and their propensities, has given a lesson for man to study, and when he has learned their true history, he has learned all that can be known on the subject.

It seems evident to me that the Creator had some further use for the drone than barely to fecundate the queen. I have carefully watched the drones and workers as they issue forth from the hive and take their flight together; they appear as if fired with the love of reproduction of their race. After many seasons of unsuccessful experiments, it occurred to me that it was the semen of the drone that the workers were in pursuit of. I caught a number of drones and held them in my hand until warm; then a gentle pressure between the thumb and fingers will cause them to throw out their penis, which is composed of a thin membrane, (my limits will not permit a description,) which bursting at the extremity, the semen is thrown out and held by double barbs at the joints of the genitalia, or drone's apparatus. I then placed them on a piece of board, and then procured working bees, the same as in hunting wild bees, and they licked up every particle of the semen thus extracted, and conveyed it to their hives. I repeated these experiments until perfectly satisfied. The next thing was to learn what use the workers put it to. It occurred to me that they used it in perfecting queens. I think my theory the only one that will satisfactorily explain what is now admitted to be the history of the bee, in accordance with the instinctive laws given them by the Author of Nature. And by looking at the subject from my stand-point of observation, the reproduction of the three kinds of bees becomes plain and rational.

I think that Dzierzon's theory is very correct on all points, except reproduction.

I will propose the following questions for consideration. What is it that is found in the royal jelly that is possessed of such impregnating powers as to cause the ovaries of the workers to produce drone eggs?

It has been known for three-quarters of a century, or more, that the workers could not at all times supply themselves with queens by being supplied with workers' eggs and larvæ, and they using every instinct that the Author of Nature has given them for that purpose. Now, what ingredient was wanting to perfect a queen? They were supplied with everything that seemed necessary, unless it was the semen.

Henrietta, June, 1861. E. KIRBY.

[For the "Bee Journal."]

Messrs. Editors.—I observe on page 129, *Bee Journal*, Mr. Langstroth's mode of procuring straight combs in his patent frames, which appears to me too complicated for many to use. I here wish to inquire if Mr. Langstroth or any of your readers ever tried wire cloth. Take a piece of cloth with the meshes sufficiently open for all the bees to pass conveniently through, the length of the frames and about two-thirds the depth—suspend between each frame, by a large wire that rests on the rabbets.

This appears to me will procure straight combs, and any person can easily arrange the wire with but little trouble or cost. I have never tried it, from the fact *my* bees build straight combs. I transferred about fifty stocks from the old box-hives last spring. The combs were so old but few were fit for use, consequently nearly all had to build new combs, and *only one* made crooked combs, but which could be easily taken out by an experienced hand.

Please give place to this, it may be of benefit to those troubled with crooked combs.

Since writing the above, I observe on same page (129) *Bee Journal*, you say, a young queen usually makes her hymeneal excursion on the same or the next day after hiving, &c., and on page 130, you say young queens do not usually leave on hymeneal excursions till eighth day. How is this? Does not the young queen lead off the second or after swarms on the day after leaving the cells? Please inform us.

I had twelve out of fifteen last season, in June, began to lay on fourth day after leaving cells, and three on fifth day. This season, in May, I had three kept back till fifteenth day by bad weather.

Yours, H. NESBIT.

Cynthiana, Ky., June 10, 1861.

☞ The cases referred to above differ essentially. Young queens accompany second or after swarms; but not unfrequently two or more young queens issue with a second swarm, and in such case, the hymeneal excursion is not made till one of them has been accepted or acknowledged by the bees, and all her rivals expelled or destroyed. This may involve a delay of a week or more, not from the time of swarming, but *from the time the queen left her cell.* But when only one queen accompanies a swarm which issues early and is immediately hived, she may leave for copulation on the same day that the swarm issued, though usually she does not leave till the next day—nor then, if the weather is unfavorable.

☞Please send us the names of beekeepers.

[For the "Bee Journal."]

THE AGE OF THE QUEEN.

Every apiarian should know, (as far as is practicable at least,) the age of every queen in his apiary.

Those who depend upon natural swarming, may save themselves much trouble, and frequently, the loss of a swarm, by knowing the age of their queens; or, from which stock to expect a queen, that will not fly—which she seldom fails to do, except when enfeebled by age.

When a swarm issues, if the queen is too old to fly, she drops to the ground, and (if not picked up and put with the swarm,) is usually lost, and the swarm returns to the hive, and must wait the same length of time that would be requisite to bring out a second swarm; and sometimes will not come out at all.

If the apiarian does not expect a feeble queen, the swarm will generally return to the old hive before he is aware that she cannot fly. Then his only alternative is, (if he finds her) to return her to the hive, and she will generally come out again the next day, if the weather is fair.

The queen will fly until she is four years old. At four she is too much enfeebled, and will generally, (perhaps always,) fail to fly, though her wings may appear to be whole. There may be instances when a queen will fail to fly from some other cause, but such very seldom occurs in natural swarming. The old queen is sometimes destroyed and a young one substituted. In such a case the queen might fly when she is supposed to be too old to do so. When such an instance occurs, I call her one year old, presuming that the old queen had been changed off the preceding year.

I will give my method of knowing the age of the queen.

An old stock that has cast a swarm last year, or an after swarm last year, will have a queen one year old.

I mark my hives thus, if a first swarm, on the 15th day of June:—

1st. June 15th, 1861—1. If an after swarm—thus, 2d, June 15th, 1861.

The last figure 1 denotes a first swarm, then the date, the last figure denotes the age of the queen.

A figure 2 denotes a second swarm, of course a young queen.

The hive from which the swarm came, I mark thus:—

1, June 15th, 1861, in another or different place on the hive, so that I can readily distinguish this from the mark at hiving.

By referring to this simple record on my hives, I am not at a loss when to expect a queen that will not fly.

C. COE.

Union Springs, N. Y.

[From the "Bienenzeitung."]

Introducing Queens, AND Uniting Colonies.

The excellent and infallible method of introducing queens safely among bees, at any time, recommended by Mr. Hübler, of Altenburg, was doubtless received with lively interest by every beekeeper—especially by those whose unsuccessful experiments with Italian queens were so mortifying and discouraging.

For thirty years past, I have availed myself of a process for this purpose, always attended with satisfactory results, no hostile attacks having been made on the queens introduced, nor any conflicts arisen between the bees of different colonies brought together, when this process was adopted. Judge of my surprise and gratification when I found that this specific employed by me when yet a tyro in bee culture, and tested hundreds of times by myself and my beekeeping friends, was the same precisely as that so strongly and justly recommended by Mr. Hübler, namely, *bovist*, or common puff-ball. But as Mr. H. does not describe the process as fully and minutely as the wants of the inexperienced require, I ask to be permitted to make some supplementary suggestions.

Mr. Hübler says: "When a queen is to be introduced in a colony, the bees are to be stupefied with the fumes of bovist, *but not the queen.* Why this, I do not know. I have often stupefied the entire population of five or six colonies, sometimes as many as eight, picked out the queens, found the workers together in one common mass, selected the choicest and fairest of the queens, gave her to the already partially revived workers, and invariably found that she was readily received and accepted. How would Mr. Hübler proceed to unite a number of colonies in the fall, without stupefying the whole *en masse*, and then removing the supernumerary queens?"*

He farther remarks: "The operation should be undertaken only in the evening, shortly before dusk." I have performed the operation at all hours of the day. All that is necessary is to allow the bees to recover *fully* from their stupefaction, before the hive is opened, because they may else be attacked by robbing-bees and overpowered. When only one colony is to be operated on, the process may be deferred till evening; but when a large number are to be taken in hand, as is often the case in the fall, especially in unfavorable years, it is necessary to begin the work earlier in the day in order to get through with it before dark.

Again, Mr. Hübler remarks: "The bees must not be confined while reviving, or feel as though they were under restraint, or they will commence fanning and humming violently, and many of them die from exhaustion." I generally let them hum a full hour, and longer, before I set them at liberty. It is, in fact, absolutely necessary to keep them confined a considerable time, as otherwise they will drop half stupefied from the hive, and perish miserably. They must, however, have plenty of air while confined.

Mr. Hübler says also: "They may at times indeed disgorge the honey with which their stomachs are filled; but this is of no consequence." Alas! no, my dear sir! this *is* of very great consequence. Bees should never be stupefied on a full stomach. Not only will they then besmear each other and become agglutinated together, but three-fourths of them will be suffocated, and we shall await their revival in vain. If, at a season of abundant pasturage, a queen is to be introduced, the colony should be fumigated *early in the morning*, before the bees have commenced work, and as slightly as is consistent with the required effect, or the whole colony may be ruined. For the union of entire colonies, at such times, other means are available, and no one should think of then employing bovist. At all other times, except very late in the fall when the bees have long ceased to fly, fumigation may be repeatedly resorted to without injury. By way of experiment, I have fumigated the same colony fourteen times in the course of three weeks, and yet it wintered quite as well as any other in my apiary.

Mr. Hübler proceeds: "When a virgin queen is to be substituted for a fertile one, the colony must first, by the removal of the latter, be made to feel its queenless condition, and the consequent excitement be allowed to subside." When I have succeeded in rousing a colony to full and poignant consciousness of its queenless condition, I need no longer resort to fumigation to introduce a queen safely. The advantage resulting from the use of bovist consists in this precisely, that no matter whether the colony is queenless or not, I can at once and without danger introduce among the stupefied bees any queen I may select, because they will certainly accept of her on reviving. I cannot, moreover, avoid expressing my surprise that Mr. H. makes this statement respecting virgin queens, when immediately after he proceeds to say: "I have in such cases never offered any

*According to Mr. Hubler's statement, the bees will themselves destroy the supernumerary or old queens, when one *that has not been stupefied* is given to them just before they recover from the effects of the fumigation.—ED.

other than fertile queens. Whether a virgin queen would be accepted or not, I cannot say.*" If the colony still has a queen, she must be searched for and removed after fumigation, before the stranger is introduced; or it will happen, in eight cases out of ten, that the rivals will meet in mortal combat, and one be slain before the bees revive—for queens recover sooner than workers.

Since the summer of 1859 I have received eleven Italian queens from the Rev. Mr. Dzierzon. Each of these was given to the combined population of two or three fumigated colonies of common bees; and in no instance did the bees manifest the least animosity against each other or against the stranger cast among them. I availed myself of the occasion to acquaint Mr. Dzierzon with my process; taking pains to impress him with its infallibility, because I was aware of his repugnance to the use of bovist.

Mr. Hübler further says: "When a drone-breeding colony is to be operated on, no special preparation is necessary." But what special preparation is necessary in other cases? I at least know of none. It often occurs that I do not know five minutes in advance that I shall have occasion to resort to fumigation. I simply lift the hive from its bottom board, set it over the fumes of the fungus, and in eight minutes at longest, the operation is finished. The finding of the queens, indeed, is no slight task for an inexperienced operator. Commonly she lies near the top of the heap; but frequently too she remains suspended between the combs, and has to be brushed out carefully with a feather.

"Finally," remarks Mr. Hübler; "Fumigation with this fungus is the readiest and safest mode of strengthening colonies, by the introduction of bees from other hives. They will be received without hesitation." All very true; but of the mode of proceeding in the various cases that arise, Mr. Hübler says not a word. Now, though Klopfleisch and Kirscheret, Wurster, Christ, Knauff, and many others, have written on the use of bovist, I will describe the process somewhat minutely for the benefit of those beekeepers who are yet unacquainted with the operation.

Bovist or puck ball (*Lycoperdon bovista*) is a species of fungus which grows in almost all countries. It is usually found in rank pastures, rich and rather dry meadows, and on the margin of woodlands. There are various kinds of it, the more common rarely attaining the size of a walnut; another variety is about thrice as large and somewhat egg-shaped; but the best and most serviceable is frequently found as large as a man's head, weighing from five to ten pounds. Knauff seems to have been acquainted with the smallest kind only, for he says that two or three balls are sufficient to fumigate a colony.

To use this substance conveniently in bee culture, the requisite apparatus must be provided. This consists of a small brazier to hold coals, and a bottomless box from 14 to 16 inches square and the same in height. In the top of this box a circular hole 10 or 11 inches in diameter is cut; and inside, below the top, a smooth board 6 inches broad, is placed in an inclined position, to prevent the stupefied bees from dropping into the fire. A small hole is cut in the rear, closed by a sliding door, through which the brazier can be inserted underneath the inclined board. When to be used for fumigation, this box is set on a large bottom board, the hive to be operated on is placed on it over the circular hole, and a towel or other strip of linen tied around the base of the hive to prevent the smoke from issuing. Some glowing coals are now put in the brazier and a piece of the fungus about as large as a hen's egg laid thereon; the brazier is then set under the inclined board, and the apertures closed by the sliding door. As soon as the bees feel the effects of the ascending fumes, they will commence buzzing violently, and some will speedily drop on the inclined board and roll down to the bottom board. In about five minutes the buzzing will cease, and the hive should then be gently beaten with the bare hands, the more effectually to shake down the stupefied bees from between the combs. The hive should not be immediately lifted off, for the early admission of fresh air to the bees might be followed by their premature revival, and the difficulties of the operation thereby greatly enhanced. When the much greater portion of the bees have dropped (a large number will under any circumstances remain in and between the combs,) the hive may be lifted off and set on another bottom board, the brazier taken out of the box, and the bees gently brushed into some smooth vessel from which they can afterwards be readily poured out. While thus brushing in the bees, the queen should be looked for. She will usually be found among those which have fallen last.

The further process depends upon whether the fumigation is for the purpose of uniting two or more colonies, or merely for the removal of one queen and the introduction of another. In the former case, the bees should be as thoroughly shaken out of the hives as is practicable, gently pressing the comb asunder, and placing the bees of each colony in a separate vessel, removing all

*Mr. Hubler's remarks is restricted by him to the introduction of queens in *drone-breeding colonies*.—Ed.

the queens except the largest and fairest. Then the bees of all the colonies fumigated, whatever their number, are to be poured into the hives intended for them—commencing with those last fumigated, and proceeding in regular succession to the first—for those first fumigated will first revive. The queen selected for preservation, no matter to which colony she belongs, is to be placed in the top of the mass.

The hive should now be covered loosely with a piece of thin linen readily permeable by the air, but tied around the mouth so as to confine the bees. It should be left standing thus on end, till by a violent buzzing it becomes evident that the mass of the bees have revived, and the heat issuing through the cloth shows that longer confinement might be injurious. Now invert the hive, place two strips of wood about an inch square and fifteen inches long on a bottom board, set the hive thereon and untie the cloth. The bees will immediately begin to issue, and at first it may seem as if the entire population were about absconding; but they will speedily return and become quiet. The cloth and the strips of wood are not to be removed till next morning, when all will be found in order.

But if the fumigation was merely for the purpose of introducing or substituting a queen, it is not necessary, when the colony is queenless, that all the bees should be stupefied. It is sufficient if a portion of them drop, and the new queen may be introduced among these. But if there is a queen in the hive, the fumigation must be continued long enough to cause her to drop, that she may be removed before the other is introduced, or it may happen that the bees will retain her and destroy the one offered, or both may perish in combat, before the semi-conscious workers can interfere to prevent the royal conflict.

Of course no one will think of undertaking to unite two or more colonies of bees in a movable comb hive by means of fumigation; as the union can, in such cases, be effected by a much more convenient process.

If Mr. Hübler had discovered this safe and infallible method of operating, before he procured his first Italian queens, or had been made acquainted with it by those who had long previously tested and ascertained its efficacy, he would not have been vexed by the loss of ten or a dozen of those precious insects, besides retaining in his purse nearly one hundred dollars more of ready cash.

Some readers may think that I have been needlessly diffuse and minute in this communication; but I beg them to remember that I endeavored to describe the whole process so as to make it intelligible to and available by new beginners, and even older bee keepers, who have never practiced such manipulations.

KADEN.

Mayence, January 15, 1861.

DRONE RETENTION.

A colony which does not expel its drones at the time when all the other colonies in an apiary expel theirs, may be fairly suspected of queenlessness. Still I cannot concur with those who say that every colony which retains a few drones late in the season is certainly queenless; for I have in the course of my practice, found drones in some colonies in every month, though the result showed that each had a fertile queen. In good honey years, particularly, many exceptions to the general rule will be observed. In 1811, I found recently emerged drones on the alighting board of a virgin colony of that year. In the winter of 1841–42, I had five colonies among sixteen, and in that of 1842–43 six among nine which retained drones till February; and yet only one proved to be queenless in the spring following. Last winter, a beekeeper in my neighborhood had seven colonies, which had expelled all their drones in the preceding fall, yet one of them was queenless. Hence, it is obvious that neither the presence of a few drones in the winter, nor their entire absence, is an infallible indication of queenlessness; and it is, consequently, often exceedingly difficult to form a reliable opinion of the condition of colonies in common hives. It is only when movable comb hives are used, that the true state of the case can be ascertained.

STOEHR.

Answer to an Inquiry made in No. 4, of the Bee Journal,—J. C., Providence, R. I.

Your statement contains the answer within itself. It was a surplus of queens, (the symptoms of which are the same as are observed when the queen is lost,) that causes the excitement. The queen cell you inserted had nothing to do in quieting the bees.

C. COE.

Union Springs, N. Y.

☞The Baron of Berlepsch has had colonies in his apiary which increased eleven pounds in weight in one day. Mr. Kader, of Mayence, had one which increased twenty-one pounds, and the Rev. Mr. Stein, of the same place, one which increased twenty-eight pounds in a day.

☞The *teeting* of a queen bee is produced by forcing air through the *stigmata* or breathing pores of the tracheal system; and, not as Gundelach supposed, by rubbing against each other the second and third dorsal segments of the abdomen.

☞Please send us names of beekeepers.

Diversities of Cells.

In every hive filled with comb, five different kinds of cells may, at certain seasons, be found, varying in form and size. The much greater number are the small hexagonal *worker cells;* then the larger *drone cells;* and intermediately a few rows of cells larger than the former, and smaller than the latter, which are termed *transition cells.* These are more irregular in shape, many of them being pentagonal. Besides these we may find a few *royal cells*, which are cylindrical within, somewhat deeper than common cells, considerably thicker, and attached virtually to the comb, mouth downwards, like an inverted cup. When large and closed, as they are when containing a royal chrysalis, they appear not unlike a common peanut. Many of these are ornamented with indentations resembling rudimental worker cells. A fifth kind are those *store cells*, or honey receptacles, which are built of such depth as no longer to serve for brood cells. They are used exclusively for storing up honey, and are situated on the upper portion of the combs, and in the corners of the hives. The cells of combs built in surplus honey boxes are usually of this description; and this is the chief reason why brood and pollen are so seldom found in such boxes. They are generally formed by prolonging the cells of opposite ranges of comb to such degree that, when they are capped, a single bee only can pass through the intervening space. They contain the stores of honey which the bees have laid up for their support during the winter months.

The royal cells, built by bees which—having a fertile queen—design to swarm, have a concave and smooth base, and are called *preconstructed* royal cells by the German beekeepers. Those which are built when the bees suddenly lose or are unexpectedly deprived of their queen, have a hexagonal base, showing that they are in reality worker cells transformed and enlarged. These are termed *post-constructed* royal cells. Close inspection of the royal cell, after the mature queen has emerged, will, hence, always enable the apiarian to decide whether they were built by bees designing to swarm, or by such as were merely intent on retrieving their loss. It sometimes occurs that bees after losing their queen, commence to build a number of royal cells, but leave the major portion unfinished; though they widen them somewhat cylindrically, and give them the ordinary depth of worker cells. The larvæ in such are fed like ordinary worker larvæ, but the cells are capped with convex covers, very similar to those given to drone cells, though genuine workers emerge from them. We are not aware that any plausible conjecture has been offered, why the bees leave these cells thus unfinished, or why they cap them after the manner of drone cells—whether by design, or from mere whim.

(From the "Bienenzeitung.")

Aberration of Instinct.

On the 6th of June, last year, I observed that one of my colonies which had previously appeared to be in a thriving condition, was gradually becoming weak, and that no young workers made their appearance. I gave it an overhauling, and found that it contained a drone-producing queen. After removing her and decapitating all the sealed drone brood, I introduced a fertile queen confined in a cage. Though the bees had been very restless, I was surprised to see that they refused to receive the offered queen, continuing for three or four days to manifest their dislike by constant efforts to reach and destroy her. I then took out the combs again, and found that royal cells had been built, and attempts made to rear queens from the remaining drone larvæ. On destroying these, removing all the unsealed brood, and reinserting the imprisoned queen, the bees speedily showed their willingness to receive her, and she was treated with due respect and attention when liberated.

There was obviously an error of instinct in this case, as the bees undertook to rear a queen from drone larvæ rather than accept one already fertile. This was the more surprising as they had not long been used to the presence of a drone-producing queen. If the colony had not been in a movable comb hive it would have been exceedingly difficult, if not impossible, to apply a remedy in this case.

Last spring my brother-in-law had three queenless colonies in his apiary. It was late when he discovered their queenless condition, and one of them was so greatly reduced, that it could only be restored by the insertion of combs with worker brood. Royal cells were started and a queen reared in this colony. When the young queen made her bridal excursion, the bees accompanied her in a body, and clustered on a neighboring tree as a swarm. He hived them as usual; but next day they issued again, and repeated this seven times on different days—change of hive and temporary confinement of the queen having been resorted to in vain to induce them to stay. Finally, the insertion of a comb with eggs and larvæ effected a change of temper, and they suffered the queen to leave unattended.

Here, evidently, an inordinate attachment to their queen, and desire for brood, caused the bees to pursue a course calculated more than any other to defeat their object; as the fecundation of a queen very rarely occurs while a colony is in the act of swarming.

O. Rothe.

Altschau, Feb. 5, 1861.

[For the Bee Journal.]

Prevention of Swarming.

To prevent hives from swarming, several methods have been advocated.

1. Many persons supposing that bees swarm only for want of room, aim to prevent it by furnishing abundance of room, either in the main hive or in the surplus honey receptacles. But every experienced beekeeper is aware that stocks will often swarm without occupying the surplus storage room—or after they have partially filled it with comb; and in Mexico, where bees are often kept in flour barrels, I have seen them swarm when the barrels were not near filled with comb. I have repeatedly had swarms from old gums holding over two bushels, and a few days ago a swarm issued from a stock of Italian bees, to which over two bushels of storage room for surplus honey had been given—two hives being placed over the old stock, in the method described in plate v., fig. 16, of the third edition of my book. The bees had filled the second story, and were busily at work in the third. It is very evident, therefore, that ample storage room cannot always be relied on for preventing swarming.

2. Many devices have been contrived for preventing swarming by contracting the entrance to the hive so as to prevent the queen from leaving, while free egress is allowed the workers. At one time I looked upon what I called my non-swarmer with considerable favor; but longer experience has convinced me that it will not answer. It is true that if the entrance is made exactly five thirty-seconds of an inch high, the queen cannot get out, and the bees after swarming will return to the hive. But such accuracy of adjustment is difficult to obtain, and the bees are seldom reconciled to the *squeezing* necessary to enter the hive, by which many of them have their pollen rubbed off. The whole colony is also thrown into great excitement every day, when the drones attempt to take their flight; and the entrance must be enlarged daily, early in the morning or late in the afternoon, to allow the bees to carry out dead drones and imperfect brood, which they have been dragging for hours about the contracted passage.

3. Clipping the wings of the queen to prevent swarming is an old device, but one which with the ordinary arrangement of hives can never be relied on. A queen without wings feels perfectly competent to accompany the swarm, and will hop off the alighting board and in most cases be lost in the grass. The bees return to the parent stock, to await the development of the young queens, and will then swarm, often three or four times.

4. From some experiments which I have tried this season, I think that I can effectually prevent swarming, without in the least interfering with the natural instincts of the bees.

The hives in which swarming is to be prevented should all have their alighting boards resting on a large board placed on the ground, and the wings of the queens should be clipped in the way described on page 223 of my book; so that if she leaves she may easily crawl back to the hive, when attracted by the loud hum of her returning colony. She will not be disposed to leave often; and the bees will probably aid her in destroying the maturing queens. Of this, however, I shall be more certain after an enlarged course of observations. If the bees should prevent the destruction of the young queens, and the old one should be killed, then the whole plan will fail. Of this, however, I have little fear.

L. L. LANGSTROTH.

Oxford, Ohio.

[For the "Bee Journal."]

Fertility of the Queen Bee.---Excess of Drones.

In transferring a stock from an old box holding nearly two bushels, I found about 50,000 cells, containing worker brood, and about 10,000 containing drone brood. This queen must therefore have laid nearly 3000 eggs a day. The upper third of the hive was filled with sealed honey.

From another old box, I cut out over 15,000 sealed and unsealed drones. Thousands of drones had already hatched. In examining a movable comb hive belonging to a friend, I found two of the central frames filled with drone brood. The yield of honey from this hive for two seasons had been small. The honey uselessly consumed in rearing and supporting drones in many stock hives, is sufficient to pay a generous interest on the value of the stocks.

L. L. LANGSTROTH.

[For the "Bee Journal."]

Color of Workers and Queens reared from an Italian Queen impregnated by a black drone.

I have an Italian Queen of last year impregnated by a black drone, *all* of whose worker progeny have always been well colored. I have reared, for experimental purposes, a number of queens from her brood, not one of which is well colored—most of them being quite dark, and some of them much darker than many common queens. It seems very singular that the larvæ, which if developed as a worker, would have been strongly colored, should in its transformation into a queen lose all its brilliant yellow.

L. L. LANGSTROTH.

[For the "American Bee Journal."]

Hybridizing.

The spermatheca of an unfecundated queen-bee contains a pellucid liquid. After fecundation and the introduction of the male sperm, this liquid becomes opaque, and appears milk white. Is it certain that there is no subsequent secretion of fluid on the part of the queen? The chief purpose of the liquid found in the spermatheca of a virgin queen seems to be to receive and dilute the male sperm; thereby enabling the spermatozoa to separate and disperse, and thus to pass off singly, in the act of impregnating the egg in its passage down the oviduct. In itself it possesses no fertilizing property; though, as emanating from the queen, it *may* contribute to fix on her progeny, in a greater or less degree, the specific characteristics of her own race. Thus, though a bastardized Italian queen will invariably produce only Italian drones, and occasionally common workers apparently pure, her hybrid brood will not be of uniform character, and much diversity of marking will be observable. A queen bred from the ordinary eggs of such a queen will produce common workers almost exclusively, if fecundated by a common drone; but her drones will in their markings, be of various intermediate grades. But should it happen that a queen is bred from one of her eggs which would have produced a hybrid, and chance to be fecundated by one of the hybrid drones, might not a race constant in these characteristics, be thus perpetuated by extreme care *and great good luck* in breeding?

QUERIST.

SINGULAR FACT.

On the 12th of November, 1855, Mr. F. A. Herling, of Weissenfels, passed a strip of woodland, where wood-choppers were at work clearing off the timber. Some of them had just felled a huge hollow oak tree, in which bees had taken up their abode. They were engaged in securing the honey when Mr. H. reached the scene, and consented to let him have the bees, which he collected, placed in a rude box, and carried home. He then transferred them to a movable comb hive containing five frames with empty combs, and one with sealed honey. On opening the hive next morning to ascertain whether the queen was safe, he found the five combs also well supplied with honey, doubtless deposited by the bees, who had gorged themselves with their own stores when their old domicile was so rudely demolished, and thus carried off a supply nearly sufficient to last them through the ensuing winter.

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Monthly Management.

JULY.

In most sections of the temperate zone, July is, for bee culture, the deciding month—stamping the character of the year, either as good, midling, or bad. It is the real "harvest moon" of the bees. The colony which is to prove profitable to its owner, must gradually diminish the amount of brood it contains, and direct its energies chiefly to the accumulation of stores. This is indeed naturally the general habit of the bees, though they sometimes fail to observe it. Should the weather be moist, and thence better suited to foster brooding than honey gathering, the queen will continue to lay eggs freely, the larvæ will be carefully nursed, and even drone brood regarded with favor. Then if pasturage suddenly fails, the cells vacated by the maturing young will remain empty, and the approach of winter will find the colony ill prepared to endure the long confinement that awaits it. The beekeeper should endeavor, by all possible means, to obviate such result. His policy and his management must hence be regulated according to the weather prevalent during the month. If it be dry and permit the bees to gather honey plentifully, his main concern will be to furnish them with room for garnering their stores, by giving them access to surplus honey-boxes, and placing supers on his smaller hives. But if his bees are in movable comb hives, he can best aid them and secure his own interest by removing some of the full combs and replacing them with empty ones—thus saving them the labor of building, and enabling them to direct all their energies to the ingathering of supplies. The rapidity which they can gather honey must determine the quantity which may be taken away; and while the pasturage continues good, they will only labor the more assiduously if empty cells be constantly within their reach. This serves in reality to stimulate their industry; whereas when they are conscious of possessing an abundance, they are apt to remit their exertions and cease to labor with an activity proportioned to their numbers. The rapid and abundant gathering of honey necessarily tends to restrict brooding, because the cells are supplied with nectar as soon as the young bees emerge, and the queen has none or few in which to deposit eggs.

But if the weather be warm and wet, and pasturage scarce, the beekeeper must endeavor to check brooding as much as possible. This is sometimes effected, in common hives, by inserting a board horizontally immediately between the combs, to prevent the bees from lengthening them. It is better that bees, especially young swarms, should be constrained to fill a small space thoroughly with combs and stores, than that they be permitted to expend honey in extending downward the combs, which would probably remain in large part empty in the fall. They may have need of the honey in the winter, and the empty combs will be of no service to them then. The effectual means, however, of arresting brooding at this season, is found in the confinement of the queen, or her entire removal if she be superannuated, so as to render it doubtful whether she would survive the winter. In fact, as the expulsion of the drones usually takes place in the latter part of this month, this is the proper time for rearing young queens, by the removal of those which are two or three years old, or are less fertile than a good queen should be. Reserve queens reared in advance for this special purpose and kept in nuclii or small stocks, may now be used with great advantage in effecting the change, or supplying colonies which have become queenless after sending forth a swarm, or from which a swarm has drummed out. Parent colonies from which swarms have issued, should be examined five or six weeks after the old queen left, to ascertain whether they contain worker brood. If none can be seen and no young bees are observed, or no disposition is shown to expel the drones, such colonies may be regarded as queenless, and should be supplied with eggs and larvæ to enable them to remedy their loss, though they will more speedily be brought into good condition, if a fertile queen be introduced.

Weak and late swarms should be strengthened by inserting combs containing sealed brood taken from other stocks, and supplying them also with honey. But such supplies should be taken only from very populous colonies, having superabundant stores. If this cannot be done, two or more weak stocks should be united, and the surplus empty combs preserved for use next season. If this is done while the bees are still gathering honey, the combs injured in the operation will speedily be repaired by them, vacant spaces filled, and the whole structure brought into good wintering condition.

When pasturage begins to fail, the bees, accustomed to honey gathering, are prone to attack and rob other colonies, especially such as are queenless. If the population of these is already much reduced, the introduction of even a fertile queen will not often be of permanent advantage. They should rather be forthwith united with some other stock.

But in districts where buckwheat is extensively cultivated, or fall pasturage is abundant, it may even at this late period, be useful to make artificial colonies, especially if the apiarian has fertile queens in reserve, to be used on such occasions. The expediency of doing this depends on the strength or populousness of the colonies, and the extent and quality of the pasturage within their reach. Generally, however, it is better to allow the bees to avail themselves of the opportunity to *cram* their hives thoroughly with supplies for the winter, rather than diminish their ability for efficient labor by subdivision.

In some districts and some years early swarms produce what are called *virgin swarms*. Whether these should be preserved and treated as independent colonies, or caused to return to the parent hive by destroying the queen, depends on the strength of the swarm, the period at which it issues, and the prospect then that they may still be able to provide for their wants in the coming winter. As most beekeepers consider themselves peculiarly favored when *virgin swarms* appear in their apiaries, and flatter themselves that *their* bees will prosper, there is a general disposition to hive and preserve them; and it is hardly likely that any counter suggestions which we might make, would induce the *lucky* beekeeper to adopt a different policy.

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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. VIII.

Having in the preceding articles discussed consecutively the chief points relative to the sexuality of the bees, I shall proceed to consider some interesting theoretical topics, which have likewise a direct practical bearing.

I commence with an inquiry respecting *the fertility of the queen.*

That this quality differs in different queens, and differs in the same queen according to circumstances and seasons, can hardly have escaped the notice of any observant beekeeper. We may, therefore, restrict our inquiry to three points:

FIRST, what is the climax of fertility to which a queen may attain—that is, *how many eggs can she possibly lay in a given time,* as for instance in a day? SECOND, *what conditions her fertility?* THIRD, *what causes it to diminish?* And FOURTH, *what causes it to cease?*

1. As to the utmost attainable extent of oviposition, it is sufficient to tilt up a common hive at different seasons, to become satisfied that the fertility of the queen reaches its acme of development in the months of May and June, when the weather is warm and moist and pasturage abundant; and that at this period the number of eggs laid daily must be very great. But the question is, how many eggs *can* she lay in a day? Dzierzon says about three thousand. Others think it scarcely reaches so many hundred; and Gundelach, in his "*Natural History of the Honey Bee,*" taking one of his experiments as the criterion, assumes six hundred as the greatest number she can lay in that space of time. But, for reasons which I shall state hereafter, I never regarded Gundelach's experiment as satisfactory; and this induced me to make three myself in 1844 and 1845, in the hope of being able to throw some light on this controverted subject. In all of these, my efforts were fruitless, because, in each instance, the weather suddenly changed, and rendered my measures abortive. In 1846, I renewed the experiment with happier results. My process was as follows:

On the 7th of May, a powerful swarm issued from one of my largest and most populous colonies. I placed it in a hive fully furnished with empty combs, and at 10 o'clock precisely set it on the stand of the strongest colony in my apiary, which was removed to make room for it. I had weighed the hive and its contents before introducing the swarm, and in the evening found that the swarm weighed 15 lbs. 1 oz. Though the population was immensely increased by bees from the removed colony, I assume only 10 lbs. as the net weight of the bees, because the stores gathered by them that day certainly weighed 5 lbs. On the 8th, they carried in 9 lbs. 6 oz.; and on the 9th, 11 lbs. 2 oz.—the hive being completely covered with bees. The weather and the pasturage could not have been more propitious. The air was warm, moist and perfectly calm, and a large rape field within 200 yards of the apiary was in full bloom—a yellow sea of flowers. The weather continued so till the 10th, inclusive, and at 10 o'clock on the forenoon of that day, I took out all the combs, brushed off the bees, and transferred the former to an empty hive. I then carried them to my chamber, and began to count the eggs as Gundelach did, marking each row of cells, when counted, by inserting a needle. It was an arduous task, and lasted fully six hours; for I could not place the combs on a table, but

had to keep them suspended vertically, to prevent the honey from flowing out of the cells. Whenever a comb was examined and the eggs counted, the number ascertained was at once noted down, having previously tallied the hundreds to guard against error. It was near four o'clock in the afternoon when the enumeration was ended, and the aggregate was found to be 4813 eggs and larvæ, for a few of the eggs were already hatched. Consequently the queen must have laid, on the average, 1604 eggs per day. Gundelach assures us that, in his experiment, not an egg escaped notice. I cannot assert this in my case. There may have been from fifty to a hundred more than I counted, but certainly there was not one less. Until lately, I regarded this as the ultimatum to which egg-laying could be carried by a queen; and for the following reasons:

a. The queen of this colony was reared in 1845, and distinguished herself in that year already by her great fertility. The colony passed the winter in excellent condition, and in April, 1846, was one of the choicest in my apiary.

b. A swarm weighing ten pounds is unquestionably a large one.

c. The time at which the experiment was made, could not have been more favorable. The state of the weather, the abundance and the nearness of the pasturage were all that could, in that respect, be desired.

d. The three unsuccessful experiments made in 1844 and 1845, furnished, apparently, very different results. One swarm, weighing 4½ lbs, had 1408 eggs after a lapse of 72 hours, another weighing 3⅛ lbs., 1398, and another 4¼ lbs., only 1219. But in each of these cases the weather had suddenly changed.

Now, when all this is duly considered, it might be supposed that Dzierzon is in error in assuming that a queen can lay 3000 eggs in a day. And yet I believe that he is right, and regard my experiment of May, 1846, (and of course the previous ones also) as entirely misconceived. But wherein was the mistake? Clearly in this—that I used for the experiment a queen issuing with a *natural* swarm, instead of one accompanying a *forced* swarm. I am now satisfied by the most decisive evidence, that under certain circumstances, the most fertile queen will, even when weather and pasturage are most propitious, lay very few eggs in a day. I have examined the interior of hives at the height of the honey season, when the bees were carrying in most abundantly, and found honey stored in the upper portions of the combs, then followed brood in every stage of development down to the bottom board, with scarcely a cell left empty. Marking a certain space occupied by brood nearly mature, I observed that when the young bees emerged, the cells were, for the most part, filled with honey on the following day, leaving few comparatively—hardly fifty in all—at the disposal of the queen, to be re-supplied with eggs by her. Thus, while the weather was favorable and pasturage most ample, the queen laid few eggs per day, obviously *from the want of empty cells.* I frequently shook forced swarms on the ground, in order to let the bees enter the hives intended for them; and noticed in almost every instance that the queens, though their wings were perfect, were not in a condition to fly. I tried repeatedly to induce them to take wing, by placing them on my hand or casting them in the air. They would either crawl about slowly and clumsily, or drop almost perpendicularly to the ground. Now, it is a well-known fact, that the old queens which accompany first swarms fly with great readiness and ease, if their wings are perfect—because, for some time prior to the issuing of the swarms, they were constrained to repress the development of egg-germs, by the want of empty cells in which to oviposit. They are, consequently, more slender and lighter than the queens of forced swarms usually are, in whose hives empty cells were plenty, and there was no necessity for repressing the production of eggs. A queen, taken as it were by surprise, while laying with all the vigor of her natural ability, and suddenly transferred to a hive furnished with plenty of empty comb, will continue to lay in her accustomed manner: whereas, one issuing with a first swarm, requires time to recover her powers, and will probably not recommence laying with her pristine vigor till after the lapse of from 36 to 40 hours. It can generally be told at a glance, whether a fertile queen can fly or not. For such experiments, therefore, forced swarms should be taken from colonies in which egg-laying was prosecuted with full vigor; or if natural swarms be used, the eggs and larvæ should be counted, not on the third day after hiving, but on the tenth or twelfth. Had I done so in 1846, I should probably have obtained a different result, and one more closely approximating the estimate of Dzierzon. I attempted, in 1851, to repeat this experiment with a queen properly qualified, but was once more thwarted by an entire change of weather within ten hours after I commenced operations. I intended to make another trial this summer, but other engagements prevented me from undertaking it. But I will state the result of one investigation. On the 28th of June, the immense amount of brood in one of my hives attracted my attention, and I undertook,

with the aid of Günther, to take an accurate *census* of it. The hive was 18 inches high, 15 inches broad and 11 inches deep, and was occupied by two forced swarms united and introduced on the 10th of June. It was nearly full of comb, and the weather during the month had been peculiarly favorable to brooding. We took out comb after comb, brushed off the bees and counted as we did in 1846, though with more ease, as we were not incommoded by honey—of which the combs contained very little. There were 38,619 cells occupied by brood, and if we assume 21 days as the average time required for the maturing of a worker, the queen must have laid 1839 eggs per day, on the average. When we consider, however, that the bees had, since they were hived, built nearly all the combs (the frames having simply been provided with guide pieces), and that, consequently, the queen had at the outset hardly cells enough at command, I cannot longer entertain a doubt that many a queen, in peculiarly favorable circumstances, does sometimes lay 3000 eggs and upwards per day. Tho' Dzierzon found in one of his mammoth colonies, 60,000 cells filled with brood, so prolonged a continuance of profuse oviposition must still be regarded as a rare occurrence. And if I were asked how many eggs a queen lays per day on the average, *during the period* including the months of May, June and July, I should probably not be willing to name a higher number than six hundred. For there is a wide difference between what a queen *can do, occasionally* and *under favorable contingencies*, and what she *usually and regularly does.*

But what shall I say of Gundelach's experiment? To ascertain the greatest possible extent of egg-laying, he places a feeble colony in a hive containing only a few combs, gives us no account of the state of the weather or pasturage at the time, and yet expects us to receive the results he obtained, as settling the question! I can only exclaim with Horace,

"Indignus, quandoque bonus dormitat Homerus."

2. By what is the fertility of the queen conditioned?

a. By the personal vigor and health of the queen herself. This requires no special proof; for, that there is often a great difference in this respect between queens of the same age, and while all other circumstances are alike, cannot have escaped the notice of any experienced apiarian. We frequently find two colonies equally populous in April, and in May the one shows no marks of improvement, whilst the other is ready to send off a swarm.

b. By pasturage, weather and season. In the northern sections of the temperate zone, where in May and June the face of nature displays "one boundless blush," and her form seems veiled in an "empurpled shower of mingled blossoms," the fertility of the queen reaches its highest development, and the hives are almost literally crammed with brood. But that pasturage and weather do not alone produce this result, but that the *season* likewise contributes its influence, is evident from the fact that in July, however favorable the weather and abundant the pasturage, sometimes even excelling the conditions of June, there is almost always a smaller amount of brood produced.

c. By the age of the queen. Old queens are never as fertile as they were when young. According to my observations, they are most fertile when one year old, or in their second year; and this accounts for the usually thriving condition, in the ensuing year, of second swarms and old stocks which have sent forth swarms.

d. By the shape and dimensions of the hive. Brood is most abundant in circular hives, and next in those which are square, because, in hives of these shapes, the heat is most equably diffused. Brood is less abundant in hives which are considerably longer than broad, and also less so in such as are flat and broad, than in those which are high and narrow, because, in low and horizontal hives, the rear portion of the interior is colder than the fore part. Brood is likewise naturally more abundant in large than in small hives; and the deteriorated condition of bee culture in this country may, in a large part, be ascribed to the diminutive size of the hives so generally used. In good honey districts, where pasturage continues abundant and available for a protracted term, small hives may answer tolerably well; but in poor honey districts, in which only populous colonies can labor with success during the short period which yields them supplies, bees must be kept in large hives, if they are to be *kept* at all.

e. By the character of the combs. Colonies having new combs with worker-cells, to the exclusion of drone-cells, will produce much more brood than those which have old combs or such as contain principally drone-cells. Where hives are managed on the *nadiring* system, a large quantity of drone-combs are sure to be built; and in process of time the bees in such hives become discouraged and disinclined to labor—doing so with their wonted energy, only for a few days in the height of the honey season. The production of drone-comb can be regulated or prevented altogether, when desired, only by the use of movable comb hives.

f. By keeping bees in warm hives, which contain plenty of store honey; and especially by stimulative feeding. Warm hives and a large stock of honey, within the reach of rich supplies of pollen, exert a powerful influence on the production of brood in the spring. But nothing has so encouraging an effect as a judicious resort to stimulative feeding, when a hive is populous and its queen vigorous. Dzierzon, indeed, rather discountenances the process; but experience has taught me that a proper use of it will cause the cells to be crammed with brood in an incredibly short time, and that colonies so treated produce the earliest swarms.

g. By populousness. The queen of a strong colony will lay much more fully, and commence doing so much earlier, than one associated with a feeble body of workers. The successful development of brood also requires a certain degree of heat in the hive; and this can only be seasonably generated and adequately diffused by a dense population.

3. What causes diminished brooding?

This question is in the main, at least indirectly, answered by what has already been stated. A few additional remarks may suffice.

a. In August, a diminished production of brood is perceptible in almost all colonies. Stocks which have yielded no swarms, and the earliest first swarms, will contain very little brood about the middle of September; and from the middle of October, hardly any will be found; except, in cases where diluted honey has been liberally fed —the results of which have no bearing on this question.

b. Strong colonies will, in *mild* winters, or when they have been protected from severe cold, contain some brood at about New Year, and very generally about the middle of January. I have ascertained these facts by repeated inspection of such colonies. Feeble stocks commence brooding about the middle of March, or not till the beginning of April. A strong stock, which I examined on the 18th of January, 1846, contained 162 chrysalids, 280 larvæ and 136 eggs. A month later, the same stock contained 716 chrysalids, 1204 larvæ and 918 eggs.

4. What causes a total cessation of a queen's fertility?

The queen's fertility decreases with advancing age. She lays more and more sparingly, and no longer deposits her eggs in close and regular order in the cells, but in a scattering, irregular manner. Finally, when the contents of her spermatheca are exhausted, brooding either ceases entirely, or only drones make their appearance. I reserve my remarks on this interesting condition of matters, for a future occasion.

(For the "Bee Journal.")

Drones and Drone Brood.

In practical bee culture, the production of a large number of drones is a grievous disadvantage. Yet, where ordinary hives are used, little can be done to prevent it. Even if the drone-combs are cut out, in such hives, wherever they can be got at, or shortened as much as possible, the evil is only remedied for a time or in part, as the bees most commonly fill the vacancy with the same kind of comb, and drones are produced almost as numerously as before. It is much easier to prevent the production of drones, where movable comb hives are used, than to destroy them after they are hatched; and careful apiarians usually effect it, by taking out the combs and decapitating the embryo brood, slicing off the convex caps and a small portion of the cells with a keen knife. Still, this too, is only a partial remedy and must be resorted to repeatedly, so long as drone-eggs and larvæ remain in the cells; for the bees will hatch and nurse these to maturity, if left to their own instincts. But if, after decapitating the sealed brood, the operator dip the comb in water before replacing it in the hive, the bees will not only throw out the mutilated embryos, but also the larvæ and the eggs, and the whole mass *in esse* and *posse* will thus be got rid of. If the bees are gathering honey plentifully at the time, it will be most likely stored in the combs thus treated, as the queen will not lay eggs in cells that are not thoroughly dry. It is, of course, preferable not to allow any drone-comb to remain in the brooding chamber of a hive, but to substitute worker-comb for it. All beekeepers, however, are not always prepared to do this; and they might, perhaps, convert drone-combs into honey receptacles exclusively, when the weather has become warm, by sprinkling them with water and placing them right and left in the chamber, setting the frames with worker-comb in the middle. Young queens instinctively prefer laying in worker-cells, and are not likely to pass into the remoter and cooler parts of the hive to lay in damp drone-comb, if any worker-cells centrally situated remain unoccupied. Let some beekeeper, who has more drone than worker-comb on hand, try the experiment.

R. V.

Col. Fremont, in his Expedition in 1842, to his amazement found bees on the highest peak of the Rocky Mountains at an elevation of more than 1200 feet above the level of the sea. Humboldt supposes that those bees neither sought nor found honey at that height, but had been carried thither involuntarily by a strong upward current of air.

Humble Bees Topers!

Of the especial love of the humble-bees for the nectar of the Passion-flower, and the effect which it has on them, the following paragraph gives a graphic description.

"We regret extremely to announce that some honest humble-bees of our acquaintance have taken to drinking, and to such excess that they are daily found reeling and tumbling about the door of their houses of call—the blossoms of the Passion-flower, which flow over with intoxicating beverage; and there, not content with the drinking like decent bees, they plunge their great hairy heads into the beautiful goblet that Nature has formed in such plants, thrusting each other aside or climbing over each other's shoulders, till the flowers bend beneath their weight. After a time they become so stupid that it is in vain to pull them by the skirts and advise them to go home, instead of wasting their time in tippling. They are, however, good-natured in their cups, and show no resentment at being disturbed; on the contrary, they cling to their wine goblet, and crawl back to it as fast as they are pulled away, unless indeed they fairly lose their legs and tumble down, in which case they lie sprawling on the ground, quite unable to get up again."

If this account be not over-colored, these jovial, reckless proceedings of humble-bees are in strong contrast with the temperate habits of hive-bees, which, to judge from the interesting account Mr. Wailes has given of their visits to his Passion-flowers, hurried back to the hive as soon as they had imbibed their supply of nectar; and certainly the anecdote given by Huber, of the way in which humble-bees suffer themselves to be cajoled out of their honey by the hive-bees, indicates such a good-natured weakness of disposition as may easily be supposed to be combined with a propensity for carousing, when the opportunity presents itself. To speak seriously, however, it would be well worth ascertaining, by exact observations, whether as great a contrast between the temperance of humble-bees and hive-bees in feeding really exists, as between their easiness of temper. There can be no doubt that some races of insects vary as much in this last respect as some races of men. The difference as to irritability, between the temper of wasps and that of bees, is known to every one, but has never been so happily hit off as by Christopher North, (whose universal genius adorned every subject,) in the description of it which he has put into the mouth of the "Shepherd" in one of the *Noctes*, and which well deserves transcription here from the pages of the voluminous periodical in which it has lain entombed for thirty-five years.

"*Shepherd.*—O' a' God's creatures the wasp is the only ane that's eternally out o' temper. There's nae sic thing as pleasin' him. In the gracious sunshine, when the bees are at work murmurin' in their gauzy flight, although no gauze indeed be comparable to the filaments o' their woven wings, or, clinging silently to the flowers, sook, sookin' out the honey-dew till their verra doups dirl wi' delight—when a' the flees that are ephemeral, and weel contented wi' the licht and the heat o' ae single sun, keep dancin' in their burnished beauty, up and down, to and fro, and backwards and forward and sideways, in millions upon millions, and yet are never jostling against anither, but a' harmoniously blended together in amity, like imagination's thochts—why, amid this 'general dance of minstrelsy,' in comes a shower o' infuriated wasps, red het, as if let out o' a fiery furnace, pickin' quarrels wi' their ain shadows—then roun' and roun' the hair o' your head, bizzin' against the drum o' your ear till you think they are in at the ae hole and out at the ither—back again after makin' a circuit, as if they had repentit o' letting you be unharmed, dashin' against the face o' you who are wishin' ill to nae livin' thing, and although you are engaged out to dinner, stickin' a lang poishoned stang in just below your ee, that afore you can rin hame frae the garden swells up to a fearsome hicht, makin' you on that side look like a blackamoor, and on the opposite white as death, sae intolerable is the agony frae the tail o' the yellow imp that, according to his bulk, is stronger far than the dragon o the desert."

Blackwood's Mag. Oct. 1826.

(For the "Bee Journal.")

I have now seven apiaries, numbering in all between one and two hundred colonies. I transferred, this spring, near a hundred colonies of my own and others. It has been a very backward and hard spring on bees. A great number, throughout our country, abandoned their hives between the time the apple trees and the white clover blossomed, for want of honey. Those that were retained and fed, are doing well. Our white clover blossomed about the 15th instant; ten days later than usual. We expect our natural swarming about the 1st and 4th of July. I have made a number of artificial swarms, which are doing well. Clover blossoms now in great abundance, and the season may yet equal that of 1856—which was the best in our county for fifteen years.

SETH HOAGLAND.

Mercer, Pa., June 24, 1861.

[For the "Bee Journal."]

Drumming or Driving.

As many persons, in their endeavors to divide colonies by *drumming* or *driving*, fail of success from various causes, I wish to submit some practical remarks on the subject, and will describe the mode of proceeding I have adopted.

If a colony be liberally fumigated with tobacco smoke at the beginning of the operation, the bees will not ascend into the super-imposed hive either quickly or in large numbers. I would, therefore, advise new beginners not to use tobacco smoke on such occasions. A smoker may avail himself of a segar to keep the bees from his face, and find it a convenient protection, provided the segar is one that will burn pretty freely. For other purposes he should not think of using it, unless he has no alternative. I use rotten maple or willow wood, not worm-eaten or containing larvæ of insects, and find it far preferable to tobacco.

After blowing a little smoke into the hive to be operated on, I invert it and immediately drive the bees down among the combs by a free use of smoke. They at once begin to fill themselves with honey. Having kept them in this position three or four minutes, till they are well gorged, I blow smoke down the central part of the hive, between the combs, thereby driving the bees to the sides. I continue this till they begin to rise up to the edges. Then I set an empty hive on the other, and shut in the bees by wrapping a long and narrow strip of muslin, or a towel, around the junction of the two hives. I then commence drumming gently around the now lower sides of the hive, using two light long-handled mallets of pine wood. Actual pounding must be avoided, both because it has a tendency to confuse and irritate the bees, and also to loosen the combs from their side attachments. By proceeding in this manner, I have always succeeded in expelling a swarm in a short time, as the bees are, from the start, put in a condition favoring speedy emigration.

When inverting a hive, regard should be had to the direction in which the combs run. Never turn it over transverse to the breadth of the combs, but always parallel to the edges. The like caution is necessary, in re-inverting the hive after the operation, especially in warm weather, or the combs may be broken, or compressed by their own weight.

I prefer driving in the evening, just after the bees have ceased flying. They are then fatigued with the labors and heat of the day, and less disposed to sting than in the morning; and if the morning be cool, they will be less inclined to emigrate. I also avoid driving, when the bees are flying briskly, because, I do not like to interrupt their labors, when they are profitably employed.

If, after they have passed up into the upper hive, this be gently lifted and set on a clean, freshly planed bottom-board, the operator can generally satisfy himself, in a few minutes, whether the queen has accompanied them, as she will be compelled to drop her eggs, from the want of cells in which to deposit them, and these may be found on the board. Should none be seen, the presence of the queen may still be inferred, if the bees remain quiet in their new home, or do not commence running in quest of her, within half an hour. When it is not intended that the bees shall remain in the hive into which they were driven, but put into a movable comb hive, the latter should be set in readiness on a large sheet or cloth spread on the ground. The frames should be properly arranged and the blocks removed, so as to leave the entire passage-way or entrance clear. The bees should then be shaken down on the cloth about eighteen inches or two feet in front of the hive, and a few of them directed to the entrance, by means of a light stick or feather. These will immediately commence humming, thus attracting their companions, and the whole will speedily enter—crowding each other in their eager haste. Experienced operators usually look for the queen on this occasion; and seeing her in the crowd, is the best evidence of the success of the operation.

Having conveniences for so doing, I always carry the driven swarm to the residence of a friend, about two miles from my home, before hiving it, and leave it there three or four weeks. This enables me to replace the parent hive on its old stand. Experience has taught me that there are advantages resulting from this, which amply compensate for the trouble attending it. Those who have no such facilities, must place the new colony where the parent hive stood and transfer the latter to some other location. It is likewise a good precaution, in such cases, to supply the parent hive with a few table-spoonfuls of water daily, for a week, through a hole in the top of the hive, or by injecting it with a syringe. Bees having brood to nurse, require much water; and where the parent hive has been removed from its old stand, the want of it may occur, because, for some days after the removal, most of the bees which leave in quest of water do not return, but join the driven swarm on the old stand.

JAMES COLLUM.

Prevention of Swarming.

BY DZIERZON.

The heavy losses which beekeepers sustained in consequence of the unusually unpropitious season of 1860 and the severe winter which ensued, have convinced the hitherto incredulous that the practice of allowing the bees to follow their own instincts or whims in all cases, is far from being a rational system of bee culture. The system, which permits stocks to swarm when and as often as they please, does, indeed, occasionally produce satisfactory results in districts where fall pasturage abounds, if the weather be then favorable to the labor of the bees; but it may also, as last year's experience incontestibly proves, involve the total ruin of an apiary. The colony which is kept in a small hive with the intention that it shall swarm, will gather a smaller amount of supplies than it would have done if more ample room had been furnished. A portion of these supplies will be carried off by the departing swarms; and another portion of the remainder will be used, to enable the colony to recover its lost vigor. The swarms will devote the honey they appropriated when leaving, and much of what they afterwards gather, to comb-building and the nourishment of brood; and then, if the remainder of the season proves to be unfavorable, parent stocks and swarms will at its close, be found alike unprovided with stores for the winter. Excepting where buckwheat is extensively cultivated, fall pasturage is usually scant and of small account; and the bees will be only the worse off, if the weather permits them to fly when there is nothing for them to gather. Besides, with the exception of that yielded by buckwheat, the honey gathered from the blossoms of fruit trees, locusts, lindens, &c., is of much better quality, and assures a much more successful wintering, than such as is collected from wild flowers, &c., in autumn.

For these reasons many beekeepers are anxious to prevent or limit swarming, preferring to content themselves with a smaller yield of *good* honey, rather than jeopard the safety of their colonies. Others have not leisure to watch their apiaries, and thus suffer loss from absconding swarms, or are so situated that their swarms are apt to settle in inconvenient locations, and can only be secured and hived with great trouble, and occasionally at the risk of life. It is hence an interesting and important inquiry, whether swarming may not be prevented, and if so, *how?*

Undoubtedly, swarming may be prevented, but the process employed must be adapted to the varying circumstances. In some cases the simplest means—ventilation, enlargement of room, &c., suffice for the purpose; whilst in others more energetic and compulsive measures must be resorted to. Bees will not attempt to swarm when the requisite conditions for swarming do not exist or have been seasonably removed. Sealed royal cells and their maturing inmates impel the old queen to depart with the first swarm, and the same cause urges the departure of the first issuing young queen with the second swarm. If these royal cells or the queens be removed, swarming will certainly be prevented. Our common bees also will not swarm, or very rarely attempt it if furnished with a queen reared in the current year, nor will they usually build drone-comb or rear drone-brood; and, if populous, they will seldom fail to gather ample supplies of honey. In general, therefore, it may be regarded as an infallible preventive of swarming, to remove the old queen at the approach of the swarming season, and to destroy afterwards all the royal cells but one. If the bees were left solely to the operation of their own instinct, the mere removal of the old queen would be the most effectual means of inducing them to swarm at an early day; but since it is well known that nearly two weeks will elapse before a swarm will issue from a hive so treated, we have time to destroy the supernumerary royal cells at our convenience. But if we have a reserve queen at command, and introduce a fertile one a few days after the old queen was removed, the bees will commonly themselves destroy the royal cells they are constructing—particularly if the colony be at the same time weakened by transferring a portion of the workers, which may be used to form an artificial colony.

It will be obvious to the reader that the processes here suggested can be availed of only where movable comb hives are used—which may, however, serve as additional evidence that rational bee culture, properly so called, can only be practised with that kind of hive. But even with these, the inexperienced operator may encounter many unanticipated difficulties, and not unfrequently fail to accomplish his object. To find the queen, he may have to take out all the combs in succession; and if the hive is populous, the chances are ten to one that he will overlook her in the crowd. Practice alone can teach him where she is to be looked for; and so quicken his eyesight, as to enable him to detect her at a glance.

☞Always feed your bees for two or three days after they have swarmed, be the weather fair or foul. They will repay your attention and your liberality with usury, before the season is over.

[For the "American Bee Journal."]

Improved Colvin Guide Frames.*

Since the swarming season began, I have used a number of these sets of guide frames, and find that they answer admirably the ends intended—the combs being built, to use the words of a friend describing the results in his apiary, "as perfectly as a joiner could work with square and compass." Although the bees are sometimes inclined to abandon a hive containing such guides, they do not, after fairly beginning to work, seem to be at all incommoded by them; and the guides, not interfering with the storage of honey in the surplus boxes, may be left in the hive until those boxes are removed.

To prevent the bees from leaving, the guides may be inserted three or four days after hiving the swarm; by which time, they will have too much invested in comb, eggs and honey, to be willing to go off. If, however, the hive is placed as recommended in the July number, and the wings of the queen clipped, the guides may be used without any other precautions. Since writing that article, I have had several swarms attempt to leave; but in each instance the bees returned, and the queen crawled back to her hive.

The plan suggested in the July number, by Mr. Nesbit, will not answer, as the bees will *wave* their combs *below* the wire guides. If Mr. Nesbit will make wire guides of full length, he may secure straight combs; but he will find that such guides, whether of full length or made as he recommends, are much more expensive, complicated, and difficult to adjust, than the improved guides, while like those of tin, they cannot serve for *regulating the frames* and *holding them firmly together*. If my object was merely to obtain combs straight enough to "be taken out easily by an experienced hand," I should never use the guide frames. But Mr. Nesbit will find, in the management of a large apiary, much labor and perplexity, unless the combs are "not only *straight* but of *uniform thickness*, so that every comb will fit, without trimming, anywhere in any hive." He will also find that bees, left to themselves, will seldom build such combs.

Oxford, Ohio. L. L. LANGSTROTH.

* In the description of these frames, in the June number of the Journal, several mistakes occurred. 5 and 7 are each 9¼ inches long, by ½ inch *wide* and ¼ inch *thick;* and *eight* frames make a set.

☞We are still printing heavy editions of the "Bee Journal," and will be pleased to supply our friends with copies for gratuitous distribution.

[For the Bee Journal.]

Ed. Bee Journal.—Sir: I send you a question for your Journal, and hope it will find a correct answer.

What is the difference between the pure Italian bees and half-blooded ones, mixed either with a common drone and Italian queen, or Italian drone and common or American queen?

In the January number of your Journal, page 16, a description is given, by the Rev. George Kleine, of the Italian bee. "In the workers, the first three upper segments of the abdomen are a bright orange color, though the lower margin of the third segment is black."

I have seen Italian workers answering to the above; the first three upper segments being a bright orange color.

The first segment, being so very small, is scarcely noticed; the second is the broadest, and would be considered the first by many persons, and the third, the second.

I suppose the pure Italian bee has one broad segment colored with orange, and the next or second one nearly all colored, except the lower margin, which is black. But are they constant in color? If some have only one segment colored (the first broad one), and some again only half-colored, and some still less, being nearly or quite like the common bee, are they considered pure?—that is from the full marked ones on down to the common? If so, then how are the half-blooded ones? Have they as much as one or part of a segment striped, and so down to nothing, even with the common ones? Or have they no orange-stripe at all?

The above questions, I hope, will find correct answers, especially from those who have the pure Italians for sale. This would be satisfactory to all who contemplate purchasing the Italian bee. Perhaps some who have both the *pure* and the *mixed* Italians, can give the best answer to the above questions; also as to queens and drones.

Frenchtown, N. J., June 24, 1861. S.

MR. ROTHE speaks of an Italian queen, fecundated by a common drone, which produced Italian workers exclusively, and regards her as pure. According to my theory she must be classed among the bastardized. Such a queen can by no means be considered genuine. Her progeny may be marked and colored like the Italian workers; but she herself is no longer genuine, as the color and characteristics of the young queens reared from her worker-brood will conclusively prove. They will be dark, and the majority of them very dark. DZIERZON.

[For the "Bee Journal."]

New Mode of Hiving Bees.

In the last number of the Bee Journal, I gave a new method for preventing swarming, by clipping the wings of the queen and placing the alighting board so low that she can crawl back to her hive. It has since occurred to me, that this same arrangement may not only be used to prevent swarming, when desired, but to secure the swarm with the least labor.

As soon as the swarm issues, let the beekeeper look for the queen, and when he has found her, cover the parent stock with a large sheet (or remove it to a new place), setting the hive intended for the swarm directly before it. As soon as the returning bees begin to alight before the new hive, their queen may be given to them; and when they have entered, the hive may be removed to a new place. If the sheet be spread before the old hive as soon as the bees begin to issue, the queen will be much more easily found; and in case she is not found in season, the returning swarm will accept of any fertile queen taken from a nucleus box.

I have devised a way of clipping the wings of a queen, so as to designate her age. As soon as she becomes fertile, let her wings on one side be cut off with a pair of scissors. When the hives are examined next year, let one of her two remaining wings be removed, and the last one the third year. By adhering strictly to this plan, we always know as soon as we see her, the age of any queen.

For some years, I have been lamenting the loss of those youthful eyes with which, after long practice, I could see a queen almost at the first glance, in examining a comb or after shaking a swarm upon the hiving sheet. The brilliant colors of the Italian queens have almost, if not quite, supplied the loss of failing vision and enable even spectacled eyes to find them with surprising ease, as they are much more easily distinguished from Italian workers, than are common queens from common workers. By those who know the great saving of time, in being able quickly to find the queen, the Italian variety would be highly prized, if it was not in any other respect better than the black bee.

For this, as well as other reasons, I would advise all engaged in rearing these queens, to retain only such as are well colored.

Oxford, Ohio. L. L. LANGSTROTH.

"O, balmy, breezy, bounteous, beauteous summer!
To men and women, little girls and boys,
To birds and beasts thou bringest many joys,
And art, indeed, a truly welcome comer!"

[For the "Bee Journal."]

I am desirous of hearing through your valuable paper, an answer to the following inquiry. I see, by advertisements of different parties, several kinds of Movable Comb Hives offered, which claim to be different patents, or to belong to different persons. As there are many beekeepers that will, this coming season, invest money in such hives, and as the Patent Office never issues two patents for the same invention, what hive can a subscriber purchase and secure the movable comb principle, and not be held liable to other parties for infringements? Should I purchase of Harbison or of Flanders, would I be safe in the use of it? As the Journal is devoted to the interest of beekeepers, a word or two might, perhaps, save innocent persons from being swindled. SUBSCRIBER.

☞The inquiry addressed to us above, involves a legal question, which it is not *our* province to decide, even if we were in possession of all the facts needed to form a correct opinion. We have a very thorough conviction of the superiority of movable comb hives, and believe that no intelligent beekeeper can fail to see in what that superiority consists. But the other point, we must needs leave to the judgment of the proper legal tribunal.

EXCELLENT ADVICE.

If thou wilt have the favor of thy bees, that they sting thee not, thou must avoid some things which offend them. Thou must not be uncleanly; for impurity and sluttishness (themselves being most chaste and neat,) they utterly abhor. Thou must not come among them smelling of sweat, or having a stinking breath, caused through eating of leeks, onions, garlic and the like. Thou must not be given to surfeiting or drunkenness; thou must not come puffing and blowing unto them, neither hastily stir among them, nor resolutely defend thyself when they seem to threaten thee; but softly moving thy hand before thy face, gently put them by. And lastly, thou must be no stranger to them. In a word, thou must be chaste, cleanly, sweet, sober, quiet and familiar; so will they love thee and know thee from all others.—

BUTLER.

☞It has been observed long since that, in some seasons and on some soils, buckwheat when in blossom remains unvisited by bees or is visited by a comparatively small number only. A Mr. Bartels stated that in such cases the buckwheat yields no honey, or only little here and there in spots, and that the consequence is a poor crop of grain at harvest time, or an entire failure. Can any of our bee keeping farmers inform us whether this statement is correct?

[For the "Bee Journal."]

Messrs. Editors.—I have had an opportunity of reading a number of the "*American Bee Journal,*" and wish to obtain all the back numbers if you can furnish them, and consider me a subscriber for the current year—for which I enclose one dollar ($1). Direct to Rev. Byron Porter, as below.

A fact mentioned in the March number, by Dr. Asmusz of Podolsk, I have also observed to some extent, "that first swarms build their combs from front to rear in their hives; and the second after swarms build them from side to side."

I have the movable frame hive, and last summer the first swarms built on the frames regularly; a second or after swarm built from side to side, in the same kind of a hive.

If "Both Sides of the Grape Question" is yet a premium for subscribers, you may include it.

Yours respectfully, BYRON PORTER.

Shelocta, Pa., June 27, 1861.

[For the "Bee Journal."]

A MONSTER QUEEN BEE.

In examining a stock of Italian bees some weeks after it had swarmed, I found the largest unfertile queen I have ever seen. Her wings were shrivelled and the extremity of her abdomen almost as blunt as that of a drone. Her colors were extremely brilliant. After the stock swarmed, I removed all the queen-cells but one, and this, being the largest I ever saw, caused me to look forward with great interest to the proper time for the development and impregnation of its inmate. Had the stock been in a hive giving no control of the combs, it would have perished, and the cause of its ruin never have been known.

L. L. LANGSTROTH.

☞ To rear Italian queens early, Dzierzon removed the two central worker-combs from one of his hives in February, and inserted drone-combs in their place. The queen speedily supplied these with eggs which hatched; but the workers promptly removed and cast out the larvæ; so that not a drone matured. Suspecting the cause, he removed the queen after she had re-supplied these cells with eggs; and re-examining the hive four or five days after, he found the drone-brood was now well nursed and some of the cells already partially capped. The bees, conscious that drones would soon be needed, were now anxious to foster the brood, which they had before been unwilling to cherish.

☞ *Please send us the names of beekeepers.*

Song of the Bees.

BY HANNAH F. GOULD.

We watch for the light of the moon to break
And color the eastern sky,
With its blended hues of saffron and lake,
Then say to each other, "Awake! Awake!
For our winter's honey is all to make,
And our bread for a long supply."

And off we hie to the hill and the dell,
To the field, to the meadow and bower;
We love in the columbine's horn to dwell,
To dip in the lily with snow-white bell,
To search the balm in its odorous cell,
The mint and the rosemary flower.

We seek the bloom of the eglantine,
Of the pointed thistle and briar;
And follow the steps of the wandering vine,
Whether it trail on the earth supine,
Or round the aspiring tree-top twine,
And reach for a state still higher.

While each, on the good of her sisters bent,
Is busy and cares for all;
We hope for an evening with hearts content,
For the winter of life without lament
That summer is gone, its hours misspent,
And the harvest of life is past recall.

☞ During the period when bees can gather honey, those on whom that department of labor devolves, do not consume pollen. They subsist, for the time on honey alone, and eschew all cruder nutriment—obviously to keep their bodies as light as possible, and thus better qualified for flying. At such time the nursing bees and the wax producers alone mix pollen with their food, to enable them to nurture the brood properly and to promote the secretion of wax. The nursing bees leave their post only once a day if the weather be fair, generally accompanying the young bees which issue to make the first experimental trial of their wings. If prevented by unfavorable weather for several days in succession from issuing and gamboling in company with their rollicking nurselings, they are apt to become diseased; and when the confinement is of long continuance, the consequences may be fatal to those who so faithfully adhere to the discharge of their functions.

M. VON MORLOT says that dysentery does not occur among bees in summer, because they then have an abundant supply of pollen, and can fly out at all times.

Bee Culture in Common Hives.

No. II.

BY F. W. GUNDELACH.

When, towards the close of January or in the early part of February, the snows of winter have disappeared and the thermometer in the open air indicates a temperature of at least 43° Fahr., if the weather be clear, I remove the boards or blinds from before my hives, hitherto sheltered from the direct rays of the sun, that the genial warmth may induce the bees to fly and discharge their fæces. My hives are so constructed as to have an entrance in each section; and as soon as I perceive that the bees are roused and preparing to come forth, I open all these entrances to enable them to issue promptly and freely, *en masse*, without crowding or incommoding each other in the passage ways. They are thus able to make quick work of it, without either soiling each other or the exterior of the hives.

On the first mild day thereafter, I change the bottom board of all my hives. Commencing at one end of a row, I remove the bottom board of the first hive, substituting a clean and dry one in its place. Then having cleansed the removed board, I substitute it for that of the second hive; and thus proceed in regular succession to the last —one extra board thus enabling me to effect the cleansing of the whole number. By this process, all the dead bees and the droppings of wax, &c., which have accumulated during the winter, are quickly disposed of, saving the workers much hazardous labor at the more inclement season, and depriving the larvæ of the bee moth of a favorite and fostering lurking place. I have found it useful and conducive to the health of the bees, moreover, to change the bottom boards in this manner, at intervals of about two weeks, according to the state of the weather, till the spring fairly opens. This insures perfect cleanliness, and affords the apiarian an excellent opportunity to acquaint himself with the condition of each colony, so that proper measures may be seasonably resorted to, in the case of such as appear to be queenless or prove to be weak.

If I find any mouldy combs, I carefully cut them out and remove them. If a colony has lost many bees during the winter, so as to be unable to cover the combs properly, I reduce the size of the hive by taking away the lowermost ring or section. A weak colony will recover sooner and increase more rapidly in a small hive than in a large one, because the requisite degree of warmth can, in such, be more easily maintained and more equally diffused. At this season, the hives should sit close on the bottom boards, without leaving crevices through which warm air can escape or cold air enter.

In healthy and ordinarily populous colonies, brooding will commence soon after the bees have had an opportunity to discharge their fæces. In strong colonies, well furnished with stores of pollen and honey, it frequently, indeed, begins much earlier. But in feeble stocks, in which there is, consequently, a deficiency of heat, the queen will rarely begin to lay till the weather becomes warm. At first she lays only a few eggs, because the workers are not numerous enough to cover a large area of brood-comb properly, or nurse the larvæ with the constant attention which these require in their early stage.

From all this, it is evident that weak colonies can only increase their population by slow degrees. They frequently require still to be fed, when stronger stocks have already accumulated a considerable amount of stores. Hence, such colonies afford their owner little gratification, after all the pains he took for their preservation during the winter. Uniting weak stocks early in autumn cannot, therefore, be too highly commended, and should be universally adopted.

The bees usually begin to carry in pollen in March; though in mild seasons, and in sections where the willows, the alder and the hazel produce their catkins early, they will collect this substance in February. It is used by them principally in preparing food for the larvæ; and for the same purpose they carry in no inconsiderable quantity of water at this period, when the weather permits them to fly.

If the precaution was taken the previous summer to remove all queens that had reached their third year, so that all the colonies wintered had young, or at least comparatively young, queens, queenlessness in the spring will be of rare occurrence in an apiary. Queens rarely die of disease; most commonly of superannuation. But should a queenless colony, nevertheless, be discovered, the shortest and best mode of disposing of it, is to unite it forthwith with its next neighbor. This is most conveniently done by setting the queenless hive on top of the other, after shortening the combs somewhat, and opening the hole in the apex of the lower hive. Any crevices or interstices between the two hives, and the entrance of the upper one, must be closed with moist clay. The queenless bees will descend into the lower hive and unite with its population. The combs of the upper hive will be protected and cleansed by the bees, and it may be subsequently used for hiving an

early swarm, to which such ready furnished quarters will prove an acceptable outfit.

Almost all bee books describe the signs or symptoms by which queenlessness may be detected. Minute and precise as most of them are, I have generally found them to be delusive. The bees of a colony still populous, *which has drone-brood in the cells*, will fly as actively, gather honey and pollen as industriously, guard the entrance as carefully, and fan as vigorously, as those of a colony containing a healthy, fertile queen. In my judgment, the only infallible criterion of the presence of a queen, is the existence of capped worker-brood in the cells. This may easily be ascertained by inverting a hive and driving back the bees with a few whiffs of smoke, so as to be able to look down between the combs and see what they contain. Still, this can only be resorted to with success, after brooding has or ought to have made some considerable progress. Very early in the season it is unavailable.

It is a useless waste of time, at this season, to retain a queenless colony and supply it with eggs or larvæ to raise a queen. The bees will rarely undertake to raise one; but if they should, and be successful, the young queen will, from the want of drones, hardly become fertile before the middle of May; and the population will, meanwhile, have been so greatly reduced, before a new generation of workers can come upon the stage, that there is little prospect of any favorable result ultimately. An early union with a normal colony is, therefore, much the preferable mode of treating the case.

When the bees begin to gather honey plentifully, the heavier stocks should be occasionally examined, to see whether they are not deficient in empty combs; for, when these are wanting, while pasturage abounds, bees will frequently sacrifice eggs and larvæ to obtain storage room for honey. This produces a two-fold injury—checking the increase of population by the destruction of the existing brood, and depriving the queen of her usual facilities for depositing eggs. Such a colony is not likely to swarm, unless its true condition is seasonably discovered and a portion of the honey in sealed combs removed, or additional room afforded by an enlargement of the hive. If room be thus given, a portion of the honey gathered will be devoted to comb-building, and brooding will be continued without interruption.

If colonies have been reserved for wintering, whose stores are inadequate to serve them till the early spring blossoms furnish new supplies, feeding must, necessarily, be resorted to. The weight of the contents of a hive, enables us to judge pretty accurately whether there is a sufficiency of stores or not. If it falls below 11 lbs. net, the bees will need feeding, even if the combs are still new and light. If dead and disembowelled larvæ are found on the bottom board or at the entrance of the hive, it is a sure indication that there is very little, if any, honey remaining, and that hunger is constraining the bees to devour the brood. They must immediately be fed, or starvation awaits them; but it is in any case a proof of bad management, when bees are permitted to fall into so deplorable a condition.

The best mode of feeding, ordinarily available, is to give them honey in the comb, placed on the top of the hive in such a manner as to be accessible to the bees, without exposing them to the inclemency of the weather or the attacks of other colonies. When such honey is not at command, diluted honey may be substituted. This should be poured into a tumbler, covering it with a piece of coarse linen securely tied, and inverting it over the hole in the top of the hive. Over the tumbler, a small wooden box or an earthen pot should be inverted for protection. Feeding from below, that is, placing the vessel containing the honey in the hive below the combs, is injudicious, because, in cold weather, the bees of feeble colonies cannot avail themselves of it, or many will perish in the attempt; and it is unsafe, because, in mild weather, it will be apt to attract bees from other stocks, and may lead to the destruction of the colony by robbery.

The honey fed should not be so much diluted as to flow through the linen drawn over the mouth of the tumbler; and it should be slightly warmed before it is offered. I do not here advert to the use of candy or other substitutes, which bee-keepers generally cannot so readily obtain, nor so conveniently administer. Let honey be used in the manner indicated, and see to it that the tumbler be replenished as often as necessary.

Prof. ZENKER marked a number of bees with a solution of ochre, and found by observation that these left their hive five times in quest of honey, between half past five in the morning and noon —visiting a rape field in blossom, one-third of a mile distant. He could not discover that any of these marked bees left the hive in the afternoon of the same day.

Propolis dissolved in spirits of wine or turpentine has been used for varnishing tin and other polished metals, tinging them a lemon color, and protecting them from rust.

(From the "London Quarterly.")

The Honey Bee.

(SECOND MODICUM.)

In an arable country, with little waste land and good farming, very few stocks can be supported; and this has led some enthusiastic beemasters to regret the advancement of agriculture, and the consequent decrease of wild flowers—or weeds, according to the eye that views them—and the enclosure of wastes or commons. Even a very short distance will make a great difference in the amount of honey collected. We know of an instance where a beekeeper at Carshalton, in Surrey, suspecting from the fighting of his bees and other signs, that there was not pasturage enough, conveyed away one of his lightest and most worthless hives, and hid it in the Woodmansterne furzes, a distance of about a mile and a half. Fortunately it lay there undiscovered, and on removing it home he found that it had become one of his heaviest stocks. We mention this as a case coming under our own knowledge, because a late writer, who has shown rather a waspish disposition in his attacks on Mr. Cotton's system, seems to question not only the advantage, but the practicability of the transportation of hives altogether. But the fact is, that in the north of England and Scotland, where there are large tracts of heather-land apart from any habitation, nothing is more common than for the beemasters of the towns and villages to submit their hives, during the honey-season, to the care of the shepherd of the district. "About six miles from Edinburgh," says Dr. Bevan, "at the foot of one of the Pentland Hills, stands Logan House, supposed to be the residence of the Sir William Worthy celebrated by Allen Ramsay in his 'Gentle Shepherd.' The house is at present occupied by a shepherd, who about the beginning of August receives about a hundred bee-hives from his neighbors resident beyond the hills, that the bees may gather honey from the luxuriant blossoms of the mountain-heather." Mr. Cotton saw a man in Germany, who had two hundred stocks, which he managed to keep all rich by changing their places as soon as the honey-season varied. Sometimes he sends them to the moors, sometimes to the meadows, sometimes to the forests, and sometimes to the hills. He also speaks of it being no uncommon sight in Switzerland to see a man journeying with a bee-hive at his back.

There is something very interesting and Arcadian in this leading of the bees out to pasture, and it deserves more attention than it has yet met with in this country. The transportation we have hitherto spoken of is only to a short distance and on a small scale; but in Germany traveling caravans of these little wild beasts may be met with, which sometimes make a journey of thirty miles, taking four days to perform it. There is nothing new in this transmigration, for Columella tells us that the inhabitants of Achaia sent their hives into Attica to benefit by the later-blooming flowers. The most pleasing picture, however, of all, is that of the floating bee-houses of the Nile, mentioned by old and modern writers, and thus described by Dr. Bevan:—

"In lower Egypt, where the flower-harvest is not so early by several weeks as in the upper districts of that country, this practice of transportation is carried on to a considerable extent. About the end of October, the hives, after being collected together from the different villages, and conveyed up to the Nile, marked and numbered by the different individuals to whom they belong, are heaped pyramidally upon the boats prepared to receive them, which, floating gradually down the river, and stopping at certain stages of their passage, remain there a longer or shorter time, according to the produce which is afforded by the surrounding country. After travelling in this manner three months, the bees, having culled the perfumes of the orange-flowers of the Said, the essence of roses of the Faicum, the treasures of the Arabian jessamine, and a variety of flowers, are brought back about the beginning of February to the places from which they were carried. The productiveness of the flowers at each respective stage is ascertained by the gradual descent of the boats in the water, and is probably noted by a scale of measurement. This industry procures for the Egyptians delicious honey and an abundance of wax. The proprietors, in return, pay the boatmen a recompense proportioned to the number of hives carried about from one extremity of Egypt to the other."

Such a convoy of 4000 hives was seen by Niebuhr on the Nile, between Cairo and Damietta. An equally pleasing account is given by Mr. Cotton of the practice in France:—

"In France they put their hives in a boat, some hundreds together, which floats down the stream by night and stops by day. The bees go out in the morning, and return in the evening; and when they are all back and quiet, on the boat floats. I have heard they come home to the ringing of a bell, but I believe they would come home just the same, whether the bell rings or not."

"I would like," he continues, "to see this tried on the Thames, for no river has more bee food in the spring; meadows, clover, beans, and lime-trees, in different places and times, for summer."

Happy bees, whose masters are good enough to give them so delightful a treat! We can fancy no more pleasing sight, except it be the omnibusses full of school-children that are sometimes seen on a fine summer's day making for the hills of Hampstead or Norwood.

Connected with their transmigrations is the question of the extent of their flight. We believe that two miles may be considered as the radius of the circle of their ordinary range, though circumstances will occasionally drive them at least a mile further. We have read somewhere of a man who kept bees at the top of his house in Holborn, and wishing to find out where they pastured, he sprinkled them all with a red powder as they came out of the hive in the morning. Away he hied to Hampstead, thinking it the best pasture at hand, and what was his delight at beholding among the multitude of busy bees that he found there some of his own little fellows which he had "incarnardined" in the morning! The apiary of Bonner, a great bee observer, was situated in a garret in the centre of Glasgow, and that of Mr. Payne, the author of the "Bee Keeper's Guide," is in the middle of a large town.

Judging from the sweep that the bees take by the side of a railroad train in motion, we should set down their pace at about thirty miles an hour. This would give them four minutes to reach the extremity of their common range. A bee makes several journeys from and to the hive in a day; and Huish remarked that a honey-gathering bee was absent about thirty-five minutes, and a pollen-collector about half that time. The pollen or farina of flowers is doubtless much more plentiful and accessible than the honey. The same writer observed bees on the Isle of May, at the entrance of the Frith of Forth, though there was no hive kept on the island, which is distant four miles from the mainland. This is an amazing stretch of flight, considering the element over which they have to fly, the risk of finding food when they land, and the load they have to return with, if successful. Were they not wild bees of the island?

In speaking of the food of bees, we must not omit the honey-dew. This shining, gummy substance must have been often noticed, in hot weather, on the leaves of the linden, the oak, and the chestnut, by the most incurious observer. The ancients considered it either as a deposition of the atmosphere, or an exudation from the leaves of trees; for to these opinions the "*ærii mellis cælestia dona*," and "*quercus sudabunt roscida mella*," of Virgil seem to refer. Gilbert White held the singular notion that it was the effluvia of flowers evaporated and drawn into the atmosphere by the heat of the weather, and then falling down again in the night with the dews that entangle them. Its origin is certainly one of those vexed questions, which, like that of "fairy rings," yet require further light for a satisfactory explanation. At present it is impossible to reconcile the discrepancy in the observations of naturalists, some actually asserting that they have seen showers of it falling. To adjust the most common opinions, it is now generally admitted that there are two sources, if not two kinds, one being a secretion from the leaves of certain plants, the other a secretion from the body of an insect. Those little green insects, the aphides, which we commonly call blight, are almost always observed to accompany any large depositions of honey-dew, and are said to have the power of jerking it to a great distance. The subject at the present moment is attracting great attention among our naturalists, and it is probable that the clash of opinions will bring out something very near the truth. That the aphides do secrete a saccharine fluid has been long known, and the bees are not their only fellow-insects who are fond of it. Their presence produces a land of milk and honey to the ants, which follow them wherever they appear, and actually herd them like cows, and milk them, according to the statement of Kirby and Spence.

Much has been written upon the poisonous effects of certain plants, sometimes upon the honey, sometimes upon the bees themselves. Every schoolboy must remember the account given by Xenophon of the effect produced by the honey in the neighborhood of Trebizond. The soldiers suffered in proportion to the quantity they had eaten; some seemed drunken, some mad, and some even died the same day. This quality in the honey has been referred by Pliny and others to the poisonous nature of the rhododendron, which abounds in those parts; but from inquiries which we have made at Dropmore and other spots abounding with this shrub, we cannot learn that any difference is perceived in the honey of those districts, or indeed that the common bee is even seen to settle on its flowers. If the Kulmia latifolia be a native of Pontus, the danger is more likely to have arisen from that source, the honey derived from which has been known to prove fatal in several instances in America.

One remarkable circumstance about bees is the number of commodities of which they are either the collectors or confectioners. Besides honey and wax, there are two other distinct substances which they gather, bee-bread and propolis.

Before we knew better, we thought, probably with the most of our readers, when we saw a bee

"tolling from every flower the virtuous sweets," with his legs full of the dust of the stamens, that he was hurrying home with the wax to build his cell, or at least with the materials wherewith to make that wax. We thought of Titania and her fairies, who "for night-tapers crop their waxen thighs," and many other pretty things that poets have said and sung about them; or if in a more prosaic mood, we at least conceived that, if not furnishing fairy candles, they were laying the foundations for what Sir F. French calls "the gentleman's light." No such thing. Their hollow legs were filled with the pollen or farina of flowers, which has nothing whatever to do with the composition of wax, but constitutes the ambrosia of the hive—as honey does its nectar—their bee-bread, or rather, we should say, bee-pap, for it is entirely reserved for the use of their little ones. Old Butler had long ago remarked that "when they gather abundance of this stuff (pollen) they have never the more wax: when they make most wax, they gather none of this." In fact they store it up as food for the embryo bees, collecting from thirty to sixty pounds of it in a season; and in this matter alone they seem to be "unthrift of their sweets," and to want that shrewdness which never else fails them, for they often, like certain over-careful housewives with their preserves, store away more than they can use, which in its decomposition, becomes to them a sore trouble and annoyance. They are said always to keep to one kind of flower in collecting it, and the light and red color of it will often detect them as the riflers of the mignionette-bed; but we have seen them later in the season with layers of different colors, and sometimes their whole bodies sprinkled with it, for they will at times roll and revel in a flower like a donkey on a dusty road.

Whence then comes the wax? It is elaborated by the bee itself from the honey by a chemistry beyond the ken of either Faraday or Liebig, being exuded in small scales from between the armour-like folds of their body. This was noticed almost contemperanously by John Hunter and Huber, and confirmed by the most conclusive experiments of the latter. A legal friend, to whom we are indebted for most of our bee-law, thus records his own observation:—"I have often watched these fellows hanging apparently torpid, after, as I think, a plentiful meal. Suddenly they make their whole persons vibrate like the prong of a tuning fork; you cannot see their outline. This is a signal for one of the wax-collectors to run up quickly and fumble the lately agitated gentleman with the instruments with which they hold the wax; and after collecting the scales, they hasten to mould them into the comb. "What would our *bon-vivans* give if they could thus, at their pleasure, shake off the effects of a Goldsmith's Hall dinner in the shape of a temporary fit of gout and chalk-stones?

Many in their schoolboy days, though we aver ourselves to be guiltless, having too often followed Titania's advice, and

> "Honey-bags stolen from the humble-bee,"

need not to have much told them how they carry about their liquid nectar. "Kill me," says Bottom to Cobweb, "a red-hipped humble-bee on the top of a thistle, and, good monsieur, bring me the honey-bag." They never swarm without a good stock of honey in their inside, to enable them to make a fair start in their new house-keeping. The honey which they sip from the nectaries of flowers probably undergoes some change, though it be but a slight one, before it is deposited in the cells. It was formerly considered a balm for all ills, though now deemed anything but wholesome when eaten in large quantities. The following are some of its virtues, besides others which we omit, given by Butler. It is only wonderful that our grandfathers, living in the midst of such an universal medicine, should have ever died.

"Honey cutteth and casteth up phlegmatic matter, and therefore sharpeneth the stomachs of them which by reason thereof have little appetite; it purgeth those things which hurteth the clearness of the eyes: it nourisheth them very much: it breedeth good blood: it stirreth up and preserveth natural heat, and prolongeth old age: it keepeth all things uncorrupt which are put into it: and therefore physicians do temper therewith such medicines as they mean to keep long; yea the bodys of the dead, being embalmed with honey, have been thereby preserved from putrefaction," &c., &c.

The fourth product of the bee is propolis, or which we shall rather call bee-gum. It is at once the glue and varnish of their carpentry. With this resinous substance, (quite distinct from wax) they fix their combs to the sides and roof, fasten the hives to the stand, stop up crevices, varnish the cell-work of their combs, and embalm any dead or noxious animal that they catch within their hive:—

> "Caulk every chink where rushing winds may roar,
> And seal their circling ramparts to the floor."—EVANS.

Bees may often be seen settling on the ramparts of the fir, the gummy leaf of the hollyhock, or on the—we dare not use Horace Walpole's expression—varnished bud of the horse-chestnut. They are then collecting neither bread nor honey, but

gum for the purposes above mentioned. Huish mentions a case of their coating over a dead mouse within the hive with this gum, thus rendering their home proof against any impure effluvium; but they were much more cunning with a snail, which they sealed down, *only round the edge of the shell*, thus fixing him as a standing joke, a laughing-stock, a living mummy (for a snail, though excluded from air, will not die), so that he who had before carried his own house was now made his own monument.

As one of the indirect products of the bee we must not forget mead, the metheglin of Shakspeare and Dryden. It was the drink of the ancient Britons and Norsemen, and filled the scull-cups in the Feast of the Shells in the Hall of Odin. In such esteem was it held, that one of the old Welsh laws ran thus: "There are three things in court which must be communicated to the king before they are made known to any other person:—1st. Every sentence of the Judge. 2d. Every new song. 3d. Every cask of Mead." Queen Bess was so fond of it, that she had some made for her own special drinking every year; and Butler, who draws a distinction between mead and metheglin, making *hydromel* the generic term, gives a luculent recipe for the latter and better drink, the same used by "our renowned Queen Elizabeth of happy memory." The Romans softened their wine sometimes with honey, sometimes with mead —mulso.

"The good bee," says More, "as other good people, hath many bad enemies," and though opinions and systems of management have changed, the bees' enemies have remained much the same from the time of Aristotle. Beetles, moths, hornets, wasps, spiders, snails, ants, mice, birds, lizards and toads, will all seek the hives, either for the warmth they find there, or oftener for the bees, and more frequently still for the honey. The wax-moth is a sad plague, and when once a hive is infested with it, nothing effectual is to be done but by removing the bees altogether into a new domicile. Huish tells of an old lady, who, thinking to catch the moths, illuminated her garden and bee-house at night with flambeaux—the only result of which was that, instead of entrapping the marauders, she burnt her own bees, which came out in great confusion to see what was the matter. The great death's head moth (Sphinx atropus) occasionally found in considerable numbers in our potato fields—the cause of so much alarm wherever its awful note and badge are heard and seen—was noticed first by Huber as a terrible enemy to bees. It was against the ravages of this mealy monster that the bees were supposed to erect those fortifications, the description and actual drawing of which by Huber threw at one time so much doubt on his other statements. He speaks of bastions, intersecting arcades, and gateways masked by walls in front, so that the constructors "pass from the part of simple soldiers to that of engineers." Few subsequent observers have, we believe, detected the counterscarps of these miniature Vaubans, but as it is certain that they will contract their entrance against the cold of winter, it seems little incredible that they should put in practice the same expedient when other necessities call for it: and to style such conglomerations of wax and propolis, bastions, and battlements, and glacis, is no more unpardonable stretch of the imagination than to speak of their queens and sentinels.

An old toad may sometimes be seen sitting under a hive, and waiting to seize on such as, coming home loaded with their spoil, accidentally fall to the ground. We can hardly fancy this odious reptile in a more provoking position. Tomtits, which are called bee-biters in Hampshire, are said to tap at the hive, and then snap up the testy inmates who come out to see what it is all about: if birds chuckle as well as chirp, we can fancy the delight of this mischievous little ne'er-do-good at the success of his *lark*. The swallow is an enemy of old standing, as we may learn from the verses of Euenus, prettily translated by Merivale:

"Attic maiden, honey-fed
Chirping warbler, bear'st away
Thou the busy buzzing bee,
To thy callow brood, a prey?

Warbler thou, a warbler seize!
Winged, one with lovely wings!
Guest thyself, by summer brought,
Yellow guest, whom summer brings!"

Many are the fables and stories of the bear and the bees, and the love he has for honey. One, not so well known, we extract from Butler. The narrator is one Demetrius, a Muscovite ambassador sent to Rome.

"A neighbor of mine," said he, "searching in the woods for honey, slipped down into a great hollow tree; and there sunk into a lake of honey up to the breast: where, when he had stuck fast two days, calling and crying out in vain for help (because nobody in the meanwhile came nigh that solitary place—at length, when he was out of all hope of life, he was strangely delivered by means of a great bear, which coming thither about the same business that he did, and smelling the honey (stirred with his striving), clambered up to the top of the tree, and thence began to let himself down backward into it. The man, bethinking

himself, and knowing that the worst was but death (which in that place he was sure of,) beclipt the bear fast with both his hands about the loins, and withal made an outcry as loud as he could. The bear, being thus suddenly affrighted (what with the handling, and what with the noise), made up again with all speed possible. The man held and the bear pulled until with main force he had drawn *Dun out of the mire:* and then, being let go, away he trots more afeared than hurt, leaving the smeared swain in a joyful fear."

The bear, from his love of honey, acts as a pointer to the bee-hunters of the North, who note the hollow trees, which he frequents and rubs against, knowing thereby that they contain honey. "The bear," said a bee-hunter to Washington Irving, "is the knowingest varmint for finding out a bee-tree in the world. They'll gnaw for days together at the trunk till they make a hole big enough to get in their paws, and then they'll haul out the honey, bees and all."

Wasps are sad depredators upon bees, and require to be guarded against. The large mother-wasp, which is often observed quite early in the spring, and which common people call a hornet, should always be destroyed, as it is the parent of a whole swarm. In many places the gardeners will give sixpence a-piece for their destruction; and bee-masters should not refuse at least an equal amount of head-money. These brazen-mailed invaders take good care never to attack any but a weak hive: here they very soon make themselves at home, and walk in and out in the most cool, amusing manner possible. As an instance of the extent to which their intrusion may be carried, there was sent to the Entomological Society, in July last, a very complete wasp's nest found in the interior of a bee-hive, the lawful inhabitants of which had been put to flight by the burglars.

"But not any one of these" (we quote from the old fellow of Magdalen, from whom so many have borrowed without acknowledgement) "nor all the rest together, do half so much harm to the bees, as the bees." And here again they too truly represent human nature. As riches increase they set their hearts more upon them. The stronger the stock is, the more likely they are to turn invaders, and of course they fix upon the weakest and most resistless of their brethren as the subjects of their attack. Then comes the tug of war; and a terrible struggle it is. Here is an extract from Mr. Cotton's note book:—

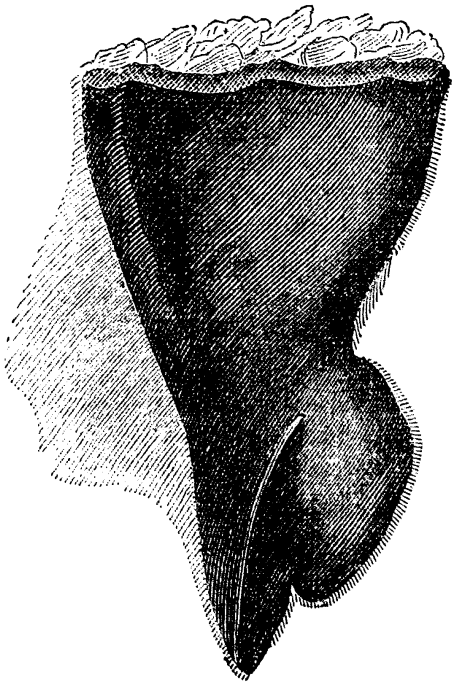
"I was sitting quietly in the even of a fine day, when my sister came puffing into the room. 'Oh! Willy, make haste and come into the garden, the bees are swarming!' 'Nonsense,' I said; 'they cannot be swarming; it is August, and four o'clock in the even'. Nevertheless, I was bound, as a loving brother, to see what grounds my wise sister had for her assertion. I got up, went to the window, and although I was at least 400 yards from my bees, the air seemed full of them. I rushed out to the garden; the first sight of my hive made me think my sister was right. On looking more narrowly, I perceived that the bees were hurrying in, instead of swarming out; and on peeping about, I saw, lying on the ground, the

'defuncta corpora vita
Magnanimum heroum.'

They all had died fighting, as the play-book says, *pro hares et foxes.* My thoughts then turned to my other stock, which was about a quarter of a mile off. I ran to it as fast as I could; hardly had I arrived there, when an advanced body of the robber regiment followed me: they soon thickened; I tried every means I could think of to disperse them, but in vain. I threw dust in the air among the thickest; and read them a passage in Virgil, which makes the throwing the dust in the air equivalent to the Bees' Riot Act:

"Hi motus animorum atque hæc certamina tanta
Pulveris exigui jactu compressia quiescent."

But all in vain. We know how often this same experiment has failed, though nothing can be more true than the rest of Virgil's description of the Battle of Bees: yet dust is certainly efficacious in causing them speedily to settle when they are swarming, whether it is that the dust annoys them, or that they mistake it for hail or rain.



Mandible of the Queen Bee.
[Greatly Magnified.]

[For the "Bee Journal."]

Introducing Italian Queens.

Most methods recommended in this country for introducing Italian queens, are attended either with considerable delay, or great danger of losing the queen. In two instances, this season, I have had a queen stung in introducing her. One was killed instantly; the other, although partially paralyzed, recovered entirely on returning her to her own colony, and appears now to be as fertile as ever.

I took away a queen from a colony of half-breeds this summer, and on offering them an Italian queen, they refused to receive her. I then placed her in a cage, and suspended her in the hive for four days and nights, offering her to them every day, and they still refused to receive her, but went on making new queen cells as fast as I destroyed them. On the third evening I took from the colony all the brood and eggs I could find. The next morning, as they still refused to receive her, I examined the hive again, and found a frame containing a few eggs that I had overlooked the evening before. I removed these, and that evening they received her very quietly.

One of the best ways I have found of introducing the queen, is to make an artificial swarm in the usual way, by removing the parent stock. The bees will usually receive her in two or three hours without any difficulty.

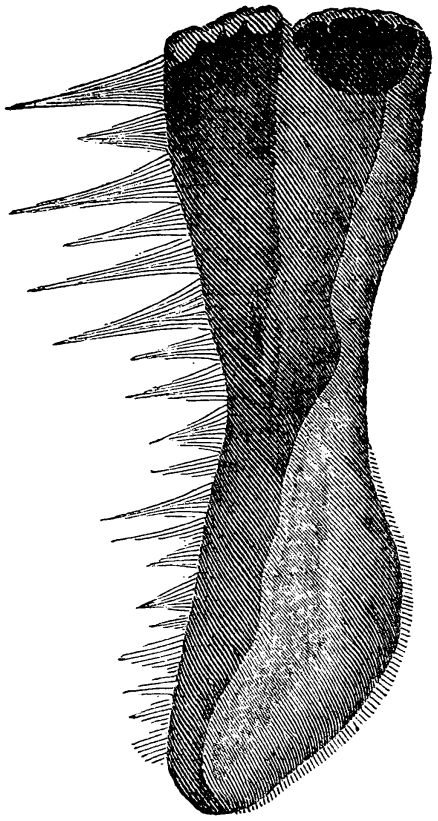
If the puff ball used in Germany, could be obtained in this country, it would, from all accounts, be a most admirable way of introducing queens and uniting stocks in the fall; but I know of nothing of the kind growing in my neighborhood, or any way of obtaining it short of importing. If any of the readers of the "*Bee Journal*" have any information in regard to it, it would be very desirable that they should communicate it to the Journal, for the benefit of beekeepers generally.*

While writing of queens, I may state one *fact* which will demolish effectually Mr. Kirby's "theory" in regard to rearing them, contained in the July number of the Bee Journal. Bees will rear a queen just as well, and in the same space of time, when there is not a drone existing within hundreds of miles of them, in the dead of winter for example, (provided they be kept sufficiently warm,) as they will in the height of the season.

I am happy to be able to inform those who have not paid much attention to the matter, that our little friends are not such disgusting little wretches as Mr. Kirby would have us believe.

Hulmesville. C. W. T.

*The *puff ball* can doubtless be found in most sections of this country, at the proper season (July and August.) In former years we have frequently seen it, of mammoth size, in York and Lancaster counties. It was obtained in the latter, near Lemon Station, on the Philadelphia Railroad, ten or eleven miles east of Lancaster, in Pequea Valley. Country lads generally know where to find it. It must be taken, and kiln-dried, before fully ripe.—*Ed.*



Mandible of the Worker Bee.
[Greatly Magnified.]

Mandible of the Drone Bee.
[Greatly Magnified.]

LIEUWENHOCK and BUFFON imagined that bees built *hexagonal* cells, because from the structure of their compound eyes, they saw all objects in that shape. How then does it happen that they give the royal cells a *cylindrical* form?

☞Please send us the names of beekeepers.

The Carpenter Bee.

An Ohio correspondent has sent us the domicile or nest of a species of *Apis* or humble bee, found there, and common, we believe, in most parts of the country.

The insect which constructed the nest referred to, is a variety of the *Apis ligniseca*, a numerous family, which Kirby says might properly be compared to *carpenters*, boring with incredible labor out of the solid wood, long cylindrical tubes, and dividing them into various cells. The account he gives of the more remarkable of these, the *Xylocopa violacea* or *Apis iricolor*, conveys a general idea of the character and habits of the entire class. This, a large species, he says, "is a native of middle and southern Europe, and is distinguished by beautiful wings of a deep violet color. It is commonly found in gardens, in the upright putrescent espaliers or vine-props, in which, and occasionally in the garden seats, doors and window-shutters, she makes her nest. In the beginning of the spring, after repeated and careful surveys, she fixes upon a piece of wood suitable for her purpose, and with her strong mandibles begins the process of boring. First proceeding obliquely downwards, she soon points her course in a direction parallel with the sides of the wood, and at length, with unwearied exertion, forms a cylindrical hole or tunnel not less than twelve or fifteen inches long and half an inch broad. Sometimes, where the diameter will admit of it, three or four of these pipes, nearly parallel with each other, are bored in the same piece. Herculean as this task, which is the labor of several days, appears, it is but a small part of what our industrious bee cheerfully undertakes. As yet she has completed but the shell of the destined habitation of her offspring; each of which, to the number of ten or twelve, will require a separate and distinct apartment. How, you will ask, is she to form these? With what materials can she construct the floors and ceilings? Why truly GOD "doth instruct her to discretion and doth teach her." In excavating her tunnel she has detached a large quantity of fibres, which lie on the ground like a heap of saw-dust. This material supplies all her wants. Having deposited an egg at the bottom of the cylinder, along with the requisite store of pollen and honey, she next, at the height of about three quarters of an inch (which is the depth of each cell,) constructs of particles of the saw-dust glued together, and also to the sides of the tunnel, what may be called an annular stage or scaffolding. When this is sufficiently hardened, its interior edge affords support for a second ring of the same materials, and thus the ceiling is gradually formed of these concentric circles, till there remains only a small orifice in its centre, which is also closed with a circular mass of agglutinated particles of saw-dust. When this partition, which serves as the ceiling of the first cell and the flooring of the second, is finished, it is about the thickness of a crown piece, and exhibits the appearance of as many concentric circles as the animal has made pauses in her labor. One cell being finished, she proceeds to construct another, which she furnishes and completes in the same manner, and so on until she has divided her whole tunnel into ten or twelve compartments.

Here, if you have followed me in this detail with the interest which I wish it to inspire, a query will suggest itself. It will strike you that such a laborious undertaking as the constructing and furnishing these cells cannot be the work of one or even of two days. Considering that every cell requires a store of honey and pollen, not to be collected but with long toil, and that a considerable interval must be spent in agglutinating the floors of each, it will be very obvious to you that the last egg in the last cell must be laid many days after the first. We are certain, therefore, that the first egg will become a grub, and consequently a perfect bee, many days before the last. What then becomes of it? you will ask. It is impossible that it should make its escape through eleven superincumbent cells without destroying the immature tenants; and it seems equally impossible that it should remain patiently in confinement below them, until they are all disclosed. This dilemma our heaven-taught architect has provided against. With forethought never enough to be admired, she has not constructed her tunnel with one opening only, but at the farther end has pierced *another* orifice, a kind of back door, through which the insects produced by the first laid eggs successively emerge into day. In fact, all the young bees, even the uppermost, go out by this road; for, by an exquisite instinct, each grub, when about to become a pupa, places itself in its cell with its head downwards, and thus is necessitated, when arrived at its last state, to pierce its cell in this direction."*

All the varieties of the *Apis* which nidificate in wood, prosecute their labor in a similar manner, though few construct habitations for their young on a scale so extensive as the one whose operations are so minutely detailed above; most of them restricting themselves to the preparation of only four or five cells for the reception of eggs.

As honey producers, none of these insects are of any account or value to man, though in other respects objects of interest to the entomologist. Dr. Dönhoff has for some years kept nests of the common humble-bee that visits the blossoms of the red clover, under cover of ordinary straw hives, in his apiary, so as to be able to observe its habits more conveniently. By marking in the summer or fall, the spot where the nests are situated in the ground, they may readily be taken up entire in the spring, removed, and placed under cover. This species produces some honey and wax; but not in sufficient quantity to justify their cultivation.

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*This may be so with the *Xylocopa violacea*, but in the case of other varieties which have come under our own observation, we suspect it is with them, as with hens, the last egg laid is the first to hatch. Certainly, we could discover no back-door or place of egress in the rear.—*Ed.*

[For the "American Bee Journal."]

A Curiosity.

MR. EDITOR:—I send you the enclosed scrap for preservation in the Journal, as I notice you have put on record already some other singular freaks of bees. This is cut from a number of the *Massachusetts Ploughman*, published in August 1842, but is not the less interesting for being old, and beekeepers will be pleased to make a note of it.

"A swarm of bees was lately found in this town, occupying a *bush* on which they had located themselves, and built their combs to the size and shape of a horse-basket. The combs were attached to the leaves, limbs, &c., of the bush, and were of all shapes to correspond with the bush to which they were attached. When found, the combs were stored with honey and well filled with young bees in every stage of perfection, presenting the appearance of a healthy and prosperous swarm.

The bush which they had chosen for their residence, was of the kind called scrub oak, and was not sheltered from wind or rain. They were transferred to a hive, and are now in the possession of the writer, apparently well pleased with their new habitation, and are doing well. The combs which they had built in their out-door residence, are preserved for the examination of the curious, it being a circumstance beyond our limited experience in the history and habits of the honey bee.

Seekonk, August 5, 1842. J. B. F."

What could have induced these bees to select so unsuitable a place for their permanent abode? Had it not been found, the entire mass must certainly have gone to destruction during the inclement weather of autumn, or the frosts and snows of winter. Does it not seem that *instinct* was at fault here?

Taunton. N. T.

☞ We do not think it at all likely that the bees *selected* the bush for their *permanent* abode. We suppose that the swarm issued from its parent hive, or some forest tree, on a sultry afternoon, and clustered in the bush in the usual manner, while the scouts were seeking suitable quarters. Before they could remove, a sudden gust of rain and wind came on and compelled them to remain. Instead of clearing off at eve, the weather, as it sometimes does, turned to a settled rainy spell of several days' continuance. The bees, being gorged with honey, commenced building combs within the cluster, attaching them to the limb or branch from which it was suspended; and depositing therein the supplies of honey brought along as an outfit. The queen likewise relieved herself by laying eggs in such empty or incipient cells as she could appropriate for the purpose. When afterwards the weather became clear and settled, their *instinctive attachment to their stores and brood* overpowered the then weaker *instinct of self-preservation*, and they continued to occupy their exposed and precarious position. There *may* have been a clashing of *instinctive impulses*, but they were governed by their then predominant feeling—unwisely, we may admit, if they can be supposed to have been gifted with a sufficient degree of *prescience* to *foresee* the remote, though inevitable result. We suspect, however, that there was no *deliberation* in the case, nor any exercise of *judgment* properly so called. Under the circumstances, they simply acted in accordance with their impulses and attachments.

[For the "Bee Journal."]

Battle among Bees.

As another curious occurrence, which I presume will be interesting to most beekeepers, as exhibiting a singular trait in the character or at least the conduct of the bee, I send you the following article, taken from the *Toledo Republican* of June 13, 1855:

"A gentleman living near Adrian, relates a singular circumstance which occurred on his farm. A few days ago, a new swarm came out of their maternal hive and gathered around their young queen, in the warm sunlit atmosphere. But instead of going to some neighboring tree or shrub, and forming a hanging cluster, as has invariably been the rule with all predecessors with whom we have been acquainted, they settled on a neighboring hive, and began a murderous attack upon the peaceable inmates.

The unsuspecting workers were taken by surprise, and many of them were killed by the invaders, before they became fully aroused, when the conflict became quite obstinate. The fact that most of the working bees of the hive were out gathering honey, gave the new swarm all the advantage; and though the battle lasted all day, they finally triumphed. Thousands of dead bodies were dragged to the entrance, and thrown on the ground each hour."

The relator does not state whether this was a *first* or a *second* swarm, and there is consequently a doubt whether its queen was a *young* one, though he calls her so.

Ridgeville. J. McG.

Meteorological.

We announce nothing new when we say that the state of the weather is of incalculable importance in bee culture. Hail storms, violent winds, and long-continued cold or rain, have often destroyed the fairest hopes of the beekeeper; and warm, dry, calm weather, with occasional showers, has always been regarded as peculiarly propitious to the labors of the bee. But the alleged peculiar effects on vegetation of what is called *sheet-lightning*, are less noticed or known. Mr. Kritz says of it, in the Bienenzeitung:—"Whether all kinds of honey-yielding plants are similarly affected by this kind of lightning, I am not aware, but from the concurrent testimony of observers, it exerts a singularly detrimental influence on the blossom of buckwheat. Beekeepers in Germany, who rely mainly on buckwheat pasturage for fall supplies for their bees, dread nothing so much as the occurrence of sheet-lightning while this plant is in blossom. They assert that it vitiates the juices of the plant and prevents the secretion of nectar in the blossoms, rendering the latter thenceforward useless for the bees. That these effects are really attributable to this cause, and flow from it, I have not only been assured by many intelligent observers and practical beekeepers, but once had an opportunity myself to ascertain the fact, while residing in a buckwheat district. It happened that on a sultry night, during which sheet-lightning, unaccompanied by thunder, prevailed almost incessantly, followed a warm day when the bees had gathered honey in great abundance from a large buckwheat field then in blossom. No rain fell, and the next day was warm and beautifully clear; but not a bee visited the buckwheat field, their supplies having been cut off at a blow, as it were. This effect of sheet-lightning appears to be most marked, if an easterly current of air prevails at the time; and the phenomenon certainly deserves to be investigated by meteorologists. The result, moreover, is alleged to be an almost total destruction of the crop."

Dr. Jähne, of Herrnhut, says that this deleterious effect of sheet-lightning has frequently been mentioned to him by beekeepers in northeastern Lusatia, where buckwheat is extensively cultivated; and several years ago he observed that, after the occurrence of such lightning during the night of the 27th of August, the bees ceased to frequent a buckwheat field in his neighborhood, though it continued to blossom for some weeks apparently with as much luxuriance as before.

☞*Please send us the names of beekeepers.*

Swarming Time.

In England, according to Wildman, bees swarm in May and June, and occasionally not till July. The time in France, M. La Gienees says, is from the 15th of May to the 15th of June, in favorable seasons; and in late springs, from the middle of June to the middle of July; in Italy, according to Contardi, at the end of April and the beginning of May; and in Sicily as early as the middle of March.

In the Greek Archipelago two swarming periods occur, one in the spring, and the other in the summer. The former corresponds with the blossoming of the sage plant, and the latter with that of the thyme; and the size of the swarms depends on the amount of honey yielded by these plants in their season.

In Switzerland, bees can seldom begin to gather pollen before the first of March, and swarming takes place in May and June, as the spring is more or less forward. Swarms coming there after the first of July, are rarely worth hiving as independent colonies, as they have neither time nor opportunity to gather sufficient stores for the winter.

The approach of swarming time is always indicated by the appearance of drones, though that is no sure evidence that swarming will follow; as the weather may subsequently prove unpropitious. Drones usually issue about six weeks after the bees of the colony begin to gather pollen; and they precede swarming (where it does take place) from one to three weeks.

In southern countries swarms are generally much larger than in northern. Della Rocca states that on the Greek Island of Syra, they not unfrequently weigh ten or twelve pounds. In the central portions of France, their average weight is about four pounds. When swarming, bees carry with them an outfit of honey in the proportion of one to four of the weight of the swarm—or, rather, of a swarm of fifteen pounds the bees weigh twelve pounds, and the honey appropriated by them weighs three. Bees gorged with honey weigh about five thousand to the pound.

It is customary in the Island of Syra, after a swarm has issued, to feed the parent stock on the following evening, half a pound of honey diluted with some wine or brandy. This is supposed to stimulate the industry of the bees and promote the fertility of the young queen after fecundation. Della Rocca says that one of his stocks thus fed on each occasion, yielded three swarms, and was fully as populous on the first of August as it had been when the first swarm issued. In the following year also, it produced a strong swarm earlier than any of his stocks which had not been so fed.

[For the "Bee Journal."]

I do not see how any one who has two hives of bees, and calls himself a beekeeper, can do without the "Bee Journal," if he can obtain it. He must be a loser by his self-denial. I have not seen a number of it yet not worth a year's subscription to one who keeps bees. I began beekeeping seven years ago with four hives bought at a vendue, and after all sorts of experiences had four hives still last spring. Some years the bees swarmed and the swarms decamped and were lost. Other years when they were safely hived, the worms killed most of the old stocks, and in the end, I had no more than at the beginning. I fared somewhat like the Irishman who lengthened his blanket by cutting off a strip at the bottom, and sewing it to the top, and then found it just as long as it was short. I counted on better luck when I began, and though quite patient, the luck did'nt come, while disappointment was a regular visitor. Early last spring I got hold of the Bee Journal by the kindness of a friend, and that changed my notions about things a good deal. My bees are in common straw hives, and I wished them out. But as no movable comb hives could be got hereaway, I had to make up my mind to do as well as I could. I resolved to try "Kritz's method," as my bees seemed to be about right for that, and the plan pleased me. Well, I tried, and succeeded. I can now report eight stocks in my garden, all as busy as bees ought to be, and promising to do well. I never had more than six before at the top of the season, with a right smart chance of worms in two or three, which always turned up forsaken by all save the millers, long before I had occasion to bother my head about "successful wintering." Now the wind sits in another quarter. I have fine thriving young colonies, and the old ones are so crowded with bees, and so full of life and bustle, that I guess the worms must look for other quarries this year. The bees seem to think that they have got a new lease of life and work with a will. The best of it is they have put new life into me, and revived my fondness for a business I was fast getting out of conceit of. All this comes from the Bee Journal. I feel as if I had lost seven years from not knowing what it has taught me. I was told when I began, that the sure way was to let the bees follow their own instincts. I did so, (sometimes unwillingly, when they swarmed,) and at last had no more than I started with. I might have known better, for if I should let my pigs always follow their own instincts, my friends would hardly ever praise my home-cured hams, or if they did it would be by way of a cool joke. In truth, I was long satisfied that the thing was wrong from tail to snout, but what else to do was the puzzle. The Bee Journal first opened my eyes, and showed me what I have found is a better way. Next year I mean to try movable comb hives if I can get any, and steer on the new tack. I send this through Mr. K———, of S———, to whom send the Journal as before, till it can come to a northern Southerner by mail. The numbers I have, have been worth more to me than four years' subscription. *Go ahead!*

Pine Bluff, Ark. J. M. U.

☞Another correspondent says, in a postscript: "I have tried "Kritz's method modified, according to the Bee Journal for May, and am delighted with it so far. I also resorted to seasonable *driving* with several other stocks, and succeeded beyond expectation. It saved me much time, trouble and anxiety. I am paid in advance for a dozen years' subscription."

[For the "Bee Journal."]

CULTURE OF MUSTARD.

Among the crops cultivated to provide pasturage for bees, hardly any is so profitable in itself as the common black mustard—yielding an abundance of seed, when ripe, and supplying the bees with a rich flow of nectar, while in blossom, and plenty of pollen. It produces a long-continued succession of flowers, the earliest opening while the plants are still small, and others follow as the stalk enlarges and throws out its branches. It comes into bloom just at the season when bees ordinarily find little to gather—after they have luxuriated on the white clover, and before the fall flowers open.

The seed should be sown about the time of putting in other spring crops, and requires a rich, clean, moist soil. Four quarts are sufficient for an acre sown broadcast, though less will answer if drilled in, as it sometimes is. It ripens unequally, and should be cut rather green, to prevent waste by shelling out. Where only a small patch is sown, it is best to do the threshing on canvas, on the ground where it grew, as much seed will be lost in hauling to the barn, unless a dewy morning or damp weather can be selected. It yields from ten to twenty bushels per acre, and sells readily at from $2.50 to $3 per bushel.

Large quantities of mustard seed are annually imported from Holland and the southern parts of Europe, to be manufactured in this country; and there is, frequently, a deficient supply. Pittsburgh and Albany are good markets for it, and, no doubt it would sell readily in any of the seaboard cities. Great care must be taken in the process of cleaning, to get it into good merchantable order. This can be effectually done by means of an improved wheat fan or winnowing machine.

The product of seed and honey would, together, make this one of the best paying crops.

Jacob Bolmar.

Account of the Bee-Eater.

BY THE REV. GILBERT WHITE,
Of Selborne, Hampshire, (Eng.)

We had in this village, more than twenty years ago, an idiot boy, whom I well remember, who, from a child, showed a strong propensity to bees; they were his food, his amusement, his sole object; and as people of this cast have seldom more than one point in view, so this lad exerted all his few faculties on this one pursuit. In the winter he dozed away his time, within his father's house, by the fireside, in a kind of torpid state, seldom departing from the chimney corner; but in the summer he was all alert, and in quest of his game in the fields and on sunny banks. Honey-bees, humble-bees, and wasps, were his prey, whenever he found them. He had no apprehensions from their stings, but would seize them *nudis manibus*, and at once disarm them of their weapons, and suck their bodies for their honey-bags. Sometimes he would fill his bosom between his shirt and his skin, with a number of these captives; and sometimes would confine them in bottles. He was a very *merops apiaster* or *bee-bird*, and very injurious to men that kept bees; for he would slide into their bee-gardens, and, sitting down before the stools, he would rap with his finger on the hives, and so take the bees as they came out. He has been known to overturn hives for the sake of honey, of which he was passionately fond. Where metheglin was making, he would linger around the tubs and vessels, begging a draught of what he called *bee-wine*. As he ran about, he used to make a humming noise with his lips, resembling the buzzing of bees.—This lad was lean and sallow, and of a cadaverous complexion; and, except in his favorite pursuit, in which he was wonderfully adroit, he discovered no manner of understanding. Had his capacity been better, and directed to the same object, he had perhaps abated much of our wonder at the feats of a more modern exhibitor of bees; and we may justly say of him now,

> "Thou,
> Had thy presiding star propitious shone,
> Should'st *Wildman* be."

When a tall youth, he was removed from hence to a distant village, where he died, as I understand, before he arrived at manhood.—*Natural History of Selborne.*

☞Hives lined with straw-matting are no new invention. They have been in use many years in Germany, Hungary, and other parts of Europe.

AMERICAN BEE JOURNAL.

Philadelphia, August, 1861.

☞We have received the first eight numbers of the fifth volume of "*L'Apiculteur*," the French Bee Journal, published in Paris, by Mr. H. Hamet, Professor of Bee Culture at Luxembourg. Unhappily we are not sufficiently familiar with the French language to peruse, with readiness and ease, the articles which the Journal contains; but patience and perseverance, and a general knowledge of the topics, have enabled us to perceive that the Journal is well edited, and creditably aided by its correspondents. It is handsomely got up, and published at six francs per annum. We hope, with the assistance of friends, to have it in our power to avail ourselves occasionally of its contents.

AGENTS.

Our friends everywhere are requested to act as Agents for our publications. The following gentlemen will receive subscriptions to the "*American Bee Journal*," or the "*Farmer and Gardener.*"

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Monthly Management.

AUGUST.

With this month, in most sections, the honey season closes. The bees continue to expel the drones, and during this period the colonies should be carefully supervised. Those which retain their drones longer than their neighbors, should be marked as suspicious, and an early occasion taken to examine them, to ascertain their condition, so that if found queenless, the proper means may be seasonably used to provide a remedy, by supplying them with a reserve queen, or uniting them with some weak stock known to be sound. Care must also be taken to prevent robbing; to which bees are much prone at this time. The removal of surplus honey, or giving additional supplies to such as have insufficient stores for the winter, should be undertaken only early in the morning or late in the evening, or on some cool day; and should be performed with all possible expedition. Honey-combs must not be placed in exposed situations, nor should the brooding chamber of movable comb-hives be uncovered for prolonged operations during the hours when bees are flying briskly. If colonies require to be fed, it should be done only at night, and the feeding boxes should be removed early in the morning, to avoid attracting bees by the odor of honey. The entrances of the hives should likewise be contracted, to enable the bees the more effectually to defend themselves and their stores in case of attack. All cracks and crevices in old box or basket hives, through which a bee might creep, must be closed with soft clay or putty. The greater the number of hives in an apiary, and the more deficient the pasturage, the more diligent must the beekeeper be to guard against robbing.

But, in districts where buckwheat is cultivated, the bees have usually renewed and abundant pasturage during a part of this month, of which they avail themselves with great eagerness. Where the supply of nectar is ample, and the weather favorable for gathering, it is well to remove the greater portion of the sealed honey, to afford the bees room for storing; and if they can, at the same time, be furnished with empty combs in good condition, they will be greatly aided in their work. Movable comb hives enable the beekeeper to perform this operation with great facility; and if the empty comb be inserted between two full ones, the re-filling will proceed still more rapidly. Where buckwheat pasturage can be confidently expected, an increased amount of honey will be secured, if the queens be confined or removed about three weeks in advance, so as to check the production of brood and consumption of honey, and also providing an increased number of empty cells. But this process must be cautiously availed of in colonies intended to be wintered, because if the queens are kept in confinement too long, the hives will contain an inadequate number of young and vigorous bees in the fall. On the other hand, it may be freely used, and with great advantage, in colonies intended to be broken up or united with others.

[For the "Bee Journal."]

Virgil and the Constellations.

Will some practical beekeeper, who has a competent knowledge of Latin and astronomy, oblige by furnishing a translation and *explanation* of the following passage in Virgil's Fourth Georgic?

> "Taygete simul os terris ostendit honestum
> Pleias, et oceani spretos pede repulit amnes:
> Aut eadem, sidus fugiens ubi Piscis aquosi,
> Tristior hibernas cœlo descendit in undas."

If by this it is meant to indicate the two seasons at which bees were deprived of their surplus honey in Virgil's time, how is the precise period, in each case, to be deduced from the astronomical data? *Pisces*, I think, always set before the Pleiads; how then can the latter be said to be, at any time, *flying* from the former?

I never had an opportunity to acquire more than a smattering of Latin, and would not undertake to construe the passage so as to make satisfactory sense of it; for it has been a puzzle to me ever since my fondness for bees induced me to venture on a re-perusal of Virgil's delightful production, conning my way through the original with plodding perseverance. Most teachers of Latin have only a general and superficial knowledge of astronomy, and none at all of bee culture. Those whom I have consulted, on various occasions, after turning each Latin word in the passage into English, appeared to think that they had done all that ought to be required of them—wholly unaware, seemingly, of the real difficulty in the case; or consigning it to the astronomers, as pertaining properly to the province of the star-gazing brotherhood.

I would ask, is the text, as we have it, corrupt? Or did Virgil, in this instance, write nonsense? Or is there any way of reconciling the poet's account of the stellar appearances with the presumed and probable time of the *mellatio verna* and *mellatio æstiva*, more especially the latter?

There are no doubt some apiarians who are also masters of Latin and astronomy; and to those I would appeal for an elucidation of the passage, such as the pedagogues seem unable to furnish, and as would keep unimpeached the poetical accuracy of the Mantuan bard—whose praise is in every apiary.

COLUMELLA.

AMERICAN BEE JOURNAL.

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(From the "London Quarterly.")

The Honey Bee.

(THIRD MODICUM.)

The bees have yet one greater enemy than those enumerated, and that is man. This leads us to consider the different systems of management and harvesting which he has adopted; and some consolation it is that, various as may be the plans proposed, there is only one exception, among the many bee-books we have lately read, to the heartily expressed wish that the murderous system of stifling the bees, may be wholly condemned and abolished. Indeed, if Mr. Cotton's statement be correct, England shares with the valley of Chamouni the exclusive infamy of destroying the servants whose toil has been so serviceable. Cobbett says, it is whimsical to save the bees, if you take the honey; but on the other hand to sacrifice them for the sake of it, is killing the goose for her golden eggs. A middle line is safest: take a part. First, be sure that you leave enough to carry a stock fairly through the winter—say thirty pounds, hive and all—and the surplus is rightly your own, for the hives and flowers you have found them, and the trouble and time you have bestowed. To devise such a method, has engaged the attention of English beemasters for many generations back; and to eke out the hive by a temporary chamber which may be removed at pleasure, has been the plan most commonly proposed. Dr. Bevan gives a detailed account of the different schemes, to which we refer readers curious in such matters. There can be but three ways of adding to a hive—first, at the top, by extra boxes, small hives, caps, or bell glasses, which may be called generally the storifying or *supering* system; secondly, at the side, by box, &c., called the *collateral* system; and thirdly, by inserting additional room at the bottom, called *nadiring*.

Before entering further on the various construction of hives, we must premise for the uninitiated that bees almost invariably begin building their combs from the top, continuing down as far as room allows them, and finishing off at the bottom in a rather irregular curved line. Each comb contains a double set of honey-cells, *dos-a-dos*, in a horizontal position. To support these in common straw hives, cross-sticks are used, around which the bees work, so that the comb is necessarily much broken in detaching it from these supports. Now it having been observed that bees, unless obstructed, always work their combs exactly parallel, and at a certain distance apart, a hive has been constructed somewhat in the shape of a common straw one, only tapering more towards the bottom, and having a lid lifting off just where the circumference is largest. On removing the lid are seen bars about an inch broad and half an inch apart, running parallel from the front to the back of the hive, and these being fixed into a ring of wood that goes round the hive, are removable at pleasure. Now it is obvious that, could we always get the bees to hang their combs along these bars, the removal of one or two of them at a time, would be a very simple way of procuring a fair share of honey without otherwise disturbing the hive. But how to get the bees always to build in this direction was the question. This Huber solved. He fixed a small piece of comb underneath each of the bars exactly parallel; the bees followed their leader, so that any one of the pendant combs might be lifted up on the bar, the bar replaced, and the bees set to work again. This starting point for them to commence from, is called the *guide-comb*, and the hive itself, though

somewhat modified, is that of the Greek Islands; the very form, perhaps, from which the Corycian old man, bringing it from Asia Minor, produced his early swarms;—from which Aristotle himself may have studied;—and which, no doubt, made of reeds or osiers of the Hyssus, had its place in the garden of Socrates—

"That wise old man by sweet Hymettus' hill."

We must refer our readers to Dr. Bevan's book for the later improvements on this hive, as respects brood and honey cells (for these are of different depths,) and the fixing of the guide-comb suggested by Mr. Golding.

* * * * * * * * * *

Safety from bees is not to be gained from any modification of hive or bee-dress whatever. If a man means to keep bees he must make them his friends; and the same qualities which will ensure him golden opinions in any other walk of life, are those which make a good beemaster. Firmness of mind with kindness of manner will enable you to do with them what you will. Like horses, they know if you are afraid of them, and will kick and plunge accordingly. Like children and dogs, they find out in a moment if you are fond of them, and so meet you half way. But, like the best tempered people in the world, there are times and seasons when the least interruption or interference will put them out of humor. A sharp answer or a sharp sting on such occasions will only be a caution, that we must watch our opportunity better for the future. He who rushes between contending armies must not complain of the flying darts; therefore in a bee-battle, unless you are sure you can assist the weaker party, it is best to keep out of the way. In very hot weather and very high winds—especially if one has much to do or say—who does not feel a little testy? Bees are the same. There is one other case where interference is proverbially ill-taken—in domestic quarrels; and herein Mr. Cotton assures us that the female spirit is as much alive in the bee as in the human kind. When the time comes in autumn for turning the drones out of the hive (of which we shall speak more fully presently,) many think they can assist the bees in getting rid of these unprofitable spouses, and so destroy them as fast as they are turned out. This uncalled-for meddling is often very fiercely resented, and the bee-keeper finds to his cost, like a good-natured neighbor who proffered his mediation on the "toast and bread-and-butter" question of Mr. and Mrs. Bond, that volunteer peacemakers in matrimonial strife

"Are sure to get a *sting* for their pains."

At all other times they are most tractable creatures, especially when, as at swarming time, they are in some measure dependant on man's aid. They are, as a villager once told us "quite humble bees then." They undoubtedly recognize their own master; and even a stranger, if a beekeeper, soon finds himself at home with them. What they cannot bear is to be breathed upon; and as people ignorant of their ways are very apt to begin buffeting and blowing when bees seem disposed to attack them, it will be serviceable for them to keep this in mind. The Rev. John Thorley, who wrote in 1744, gives a frightful account of a swarm of bees settling on his maid's head—the fear being not that they would sting her to death, as stories have been told,* but that they would stifle the poor girl, for they covered her whole face. Presence of mind failed neither—he bade her remain quite still, and searched for the queen, whom her loyal people followed with delight as he conducted her safe to her hive. Sometimes, however, where presence of mind is wanting, or where the bees have been accidentally disturbed, very serious consequences ensue.

The Bee volume in the "NATURALISTS' LIBRARY" supplies us with an anecdote, in which the anger of the bees was turned to a more profitable purpose:—

"A small privateer with forty or fifty men, having on board some hives made of earthenware full of bees, was pursued by a Turkish Galley manned by 500 seamen and soldiers. As soon as the latter came alongside, the crew of the privateer mounted the rigging with their hives, and hurled them down on the deck of the galley. The Turks, astonished at this novel mode of warfare, and unable to defend themselves from the stings of the enraged bees, became so terrified that they thought of nothing but how to escape their fury; while the crew of the small vessel, protected by masks and gloves, flew upon their enemies sword in hand, and captured the vessel without resistance."

It must strike the reader how well furnished this vessel must have been to afford on the moment "masks and gloves" for forty or fifty men. In these disturbed times the following receipt to disperse a mob, may perhaps be found useful.

* For fatal cases, one of which is related by Mr. Lawrence, in his Surgical Lectures, see Dr. Bevan's book, page 333. Animals have been frequently fatally attacked by them. Butler tells of "a horse in the heat of the day looking over a hedge, on the other side of which was a stall of bees. While he stood nodding with his head, as his manner is, because of the flies, the bees fell upon him and killed him." This exemplifies the proverb of the danger to some folk in "looking over a hedge."

We have heard of a water engine being effectively employed in the same service:

"During the confusion occasioned by a time of war, in 1525, a mob of peasants assembling in Hohenstein, in Thuringia, attempted to pillage the house of the minister of Elende, who, having in vain employed all his eloquence to dissuade them from their design, ordered his domestics to fetch his bee-hives and throw them in the middle of this furious mob. The effect was what might be expected. They were immediately put to flight, and happy to escape unstung."

As we should be sorry to rouse the fears of our readers, our object being rather to enamour them of bees, we will console them—too much perhaps in the fashion of Job's friends—with an anecdote which appeared lately in a Scotch newspaper, of an elderly gentleman upon whose face a swarm of bees alighted. With great presence of mind, he lifted up his hat, hive-like, over his head, when the bees by their natural instinct, at once recognizing so convenient a home, betook themselves to his head-gear:—it surely must have been a *wide-awake*—which he then quietly conveyed into his garden Had he fidgeted and flustered, as most old gentleman—and young ones too—would have done in his situation, he would doubtless have presented the same pitiable object that our readers must remember in Hood's ludicrous sketch of an "unfortunate Bee-ing."

We have spoken of the possibility of bee-pasturage being overstocked, and such may be the case in certain localities; but we are very confident that this is not the general state of the country. We are assured that hives might be multiplied tenfold, and yet there would be room; for certainly more than five times the quantity of honey might be taken. But then it will require an improved system of management, more constant attention paid to the hive, more liberal feeding in spring and autumn, and more active measures against their chief enemies. In all these matters we must look to the enterprising, intelligent and philanthropic classes to take the lead. We know many, both rich and poor, who do not keep bees on account of the murder they think themselves forced to commit. Let such be assured that this slaughter is not only unnecessary, but unprofitable too. But, on the other hand let no one fancy that all he has to do is to procure a swarm and hive, and set it down in the garden, and that streams of honey and money will forthwith flow. Bees, like everything else that is worth possessing, require attention and care. "They need," says a poor friend of ours, "a deal of shepherding;" and thus, to the individual who can afford to give them his time, they may be made a source of great profit as well as pleasure. Our own sentiments cannot be given better than in Mr. Cotton's words:

"I would most earnestly beg the aid of the clergy and resident gentry—but, above all, their good wives; in a word, of all who wish to help the poor who dwell round about them in a far humbler way, yet perhaps not less happily; I would beg them, one and all, to aid me as a united body in teaching their poor neighbors the best way of keeping bees. . . . A hive of bees keeps a man at home; all his spare moments may be well filled by tending them, by watching their wondrous ways, and by loving them. In winter he may work in his own chimney corner at making hives, both for himself and to sell. This he will find almost as profitable as his bees, for well made hives always meet with a ready sale. Again if his bee hives are close to his cottage door; he will learn to like their sweet music better than the dry squeaking of a pot-house fiddle, and he may listen to it in the free air, with his wife and children about him."

We hold to the opinion already expressed, of presence of mind being the best bee-dress, notwithstanding the anecdote of M. de Hofer, privy counsellor to the Grand Duke of Baden, who, having been a great beekeeper, and almost a rival of Wildman in the power he possessed over his bees, found, after an attack of violent fever, that he could no longer approach them without exciting their anger—in fact, 'when he came back again, they tore him where he stood.' "Here, then, it is pretty evident," says the doctor who tells the story, "that some change had taken place in the counsellor's secretions, in consequence of the fever, which, though not noticeable by his friends, was offensive to the olfactory nerves of the bees." Might not a change have taken place in the counsellor's nerves?

As critics as well as counsellors may be stung, we have, for our own good and that of the public, examined all the proposed remedies, and the result is as follows:—Extract at once the sting, which is almost invariably left behind: if a watch key is at hand press it exactly over the wound, so that much of the venom may be squeezed out; and in any case apply, the sooner of course the better, Laudanum or the least drop of Spirit of Ammonia. Oil and honey which are also recommended, probably only act in keeping off the air from the wound. The cure varies very much with the constitution of individuals; but the poison being acid, any alkali will probably be serviceable.

But, with reference to the cottager, we must consider the profit as well as the sting; and this it will be far better to underrate than to exaggerate. Tell a poor man that his bees, with the most ordinary care, will pay his rent, and he will find your word is good, and that he has something to spare for his trouble. He may then be led to pay the same respect to his little lodgers as the Irish do to the less cleanly animal that acts the same kindly part of rent payer by them. But when the marvellous statistics of some bee books are laid before a laborer, their only effect can be to rouse an unwonted spirit of covetousness, which is more than punished by the still greater disappointment that ensues.

Dr. Warden, a physician of Croydon, who wrote in the year 1712, a book called "The True Amazons, or the Monarchy of Bees,"—and of whom we can discover nothing more than that the front of his bee-house was "painted with lions and other creatures not at all agreeable,"—found the neighboring furze of Coombe and Parley not "unprofitably gay," if we may believe his assertion that his bees brought him in two hundred dollars a year. He might have passed rich at that time in such a locality, if his physician's fees brought him in an equal sum. That the ancients did not neglect the profit to be derived from their hives, we learn from Virgil's old gardener—to whom we cannot too frequently recur; and from two veteran brothers mentioned by Varro—the types perhaps of the Corycian of the Georgics—who turned the little villa and craft left them by their father, into a bee-house and bee-garden, realizing, on an average, 10,000 sesterces a year. They seem to have been thrifty old bachelors, and took care to bide a good market. Among the plunder of Verres were about 400 amphora of honey.

We will now suppose that, having made up our mind on the matter of profit, and being sting-proof, we have got an old-fashioned straw-hive, which we purchased in autumn for a guinea, safely placed under our heath-thatched bee-house; that we have also got one of the improved Grecian straw-hives ready to house the first swarm in. Some fine morning in May or June, a cluster of bees having hung out from the hive some days before, the whole atmosphere in the neighborhood of the bee-house seems alive with thousands of the little creatures, whirling and buzzing, passing and repassing, wheeling about in rapid circles like a group of maddened bacchanals. This is the time for the bee-master to be on the alert. Out runs the good housewife with the frying-pan and key—the orthodox instruments for *ringing*—and never ceases her rough music till the bees have safely settled in some neighboring bough. This custom, as old as the birth of Jupiter, is one of the most pleasing and exciting of the countryman's life. Hogarth, we think, introduces it in the back ground of his "Country Noises," and there is an old colored print of bee-ringing still occasionally met with on the walls of a country inn that has charms for us, and makes us think of bright sunny weather in the dreariest November day. We feel quite with Mr. Jesse, that we should regret to find this good old custom fall into disrepute. Whether, as Aristotle says, it affects the bees through pleasure or fear, or whether indeed they hear at all, is still as uncertain as that philosopher left it; but we can wish no better luck to every beemaster that neglects it, than that he may lose every swarm for which he omits to raise this time-honored concert.

The first settlement, or clustering, is, without doubt, merely a rendezvous before their final emigration. If not hived, they will soon be off, and in a direct line, for some convenient spot which has been marked by them before. We have known them to make straight for an old hollow pollard, the only one to be found within a mile or two of the hive. The old queen always accompanies the first swarm; and for this a fine day is reckoned more necessary than for the after-swarms, as it is the old lady that shows the greatest dislike to leave home in bad weather. If this swarm again sends forth a colony the same year, as sometimes occurs, it is the same queen again which puts herself at the head of her nomade subjects. Indeed there seems to be very little of the old woman about her.

There appears to be no unerring method by which the exact time when the first swarm will leave the hive, can be determined—their hanging out from the entrance being very fallacious—except by watching the general state of things within. With the after-swarms, however, there is a most curious and certain sign in the "piping" or "trumpeting" of the queen and the princesses, to which we have before referred. About the ninth day from the issuing of the first swarm, if another colony is about to leave the hive, this singular duet, in the most regular intonation, between the emerged queen and the princess still a prisoner in her cell, is heard; and extravagant as the account may seem, and confused and embellished as it has been from the times of Aristotle and Virgil till recent days, it is now the practical sign by which every attentive bee-keeper judges of the time of emigration of the after-swarms.

The second swarm is called a "cast,"* the third a "smart," the fourth a "squib." A swarm from a swarm is called a "maiden or virgin swarm," and the honey is reckoned more pure. It seldom, however, happens that there are more than two from the same hive, except in a year when the season opens unusually early, the pasturage is uncommonly abundant, and the weather continuously favorable. There are, on an average, two particularly good years in every ten, and one particularly disastrous to the bees—as was the year 1860.

It is time to say something of her Majesty of the Hive. She is the mother as well as the queen of her people, laying from 80,000 to 100,000 eggs in a year; and it is not till she gives symptoms of continuing the race, that the full tide of her subjects' affection is poured forth towards her. There are different cells formed for the queen, the worker and the drone. The bees, like a wise and loyal people as they are, do not stint their sovereigns to the same narrow mansions as content themselves. They build their royal cells much thicker and stronger, and of more than twice the size. Nay, unlike the surly Brighton blacksmith, who hesitated to give up his house for the convenience of his sovereign, they think nothing of pulling to pieces and converting several of their common cells when royalty requires it; and vote with alacrity in their committee of supply every demand made for the extension and improvement of their sovereign's palace. When finished, these miniature mansions resemble the inverted cup of an acorn somewhat elongated. We said that each hath its peculiar cell. But it has happened, either in the flurry of the queen, or from some unaccountable accident, that a drone egg has been placed in a royal cell. Time goes on, and the egg swells, and becomes a larvæ, and then a pupa, and the bees feed it with royal food, watch its progress with anxious care, and hover in the ante-chamber in nervous expectation of the royal birth. Judge then of their surprise when, instead of a princess royal, if any thing comes forth, out walks the awkward and mystified changeling of a drone. Usually, however, the drone larvæ which chances to be nursed in a royal cell, dies before maturity; and the cell, when opened, is found to contain merely a *caput mortuum.*

*The following *doggerelized* "proverbial philosophy" will give the supposed relative value of early and late swarms:—

"A swarm of bees in May
Is worth a load of hay;
A swarm of bees in June
Is worth a silver spoon;
A swarm in July
Is not worth a fly."

It would be an endless work to recount the many stories told of the devoted attachment of these good people to their queen. Her presence among them is their life and glory. She is the mainspring upon which all their work, their order, their union, their happiness seems to turn. Deprive them of her, and all is confusion, disorder, and dismay. They seem to mourn for her when dead, and can with difficulty be withdrawn from her corpse. All the wonderful works with which Wildman, the bee-conjuror, astonished the last generation, were effected by taking advantage of their instinctive loyalty. He made the bees follow him whither he would; hang first on this hand, then on that, or settle where his spectators chose. His secret consisted in having possession of the queen, whom they clustered round wherever he might move her. Nor are they merely summer friends; the workers will defend their queen in the utmost strait, and lay down their lives for her—for they sting but once, and that sting is death to them;

"*Animasque in vulnere ponunt.*

We must not, however, invariably expect the same conduct; perhaps, indeed, if it were so, it would lower the quality of the feeling, and reduce it to too mechanical an instinct. Bees like men, have different dispositions, so that even their loyalty will sometimes fail them. An instance not long ago came to our knowledge, which probably few beekeepers will credit. It was that of a hive, which, having early exhausted its store, was found, on being examined one morning, to be utterly deserted; the combs were empty, and the only symptom of life was the poor forsaken queen herself, "unfriended, melancholy, slow," crawling over the honeyless cells; a sad spectacle of the fall of bee-greatness. Marius among the ruins of Carthage, or Napoleon at Fontainebleau—were nothing to this!

[For the "Bee Journal."]

A royal Cell opened by the Bees, and closed again.

On opening a nucleus, whose queen had just hatched, I found the bees busily enaged in destroying the remaining queen cells—three of which they had opened on their sides. Two of these cells, which contained queens still alive and nearly mature, I removed—taking away the hatched queen, and giving the colony brood from which to rear a new supply. On examining the hive again, the third royal cell, which contained a queen much less matured, had been closed again, the bees covering the opening with a protuberance of wax lighter colored and smoother than the body of the cell, and very much like the cap put on the apex of the royal cell.

L. L. LANGSTROTH.

[For the "Bee Journal."]

Very Knowing Bees.

Mr. Sanderson, (son of the Rev. Mr. Sanderson of this place,) sends the following interesting fact in Natural History, from Arequiperu, Peru :—

"A few years ago, a German got out a few hives of bees, an insect formerly unknown here. The first year he obtained a plentiful supply of honey, but year by year it decreased, until now the animals will hardly collect any. And why? Our climate is so equable that flowers can be had all the year round, and the sagacious animals having discovered this fact, have evidently lost the instinct of hoarding honey for a winter that never comes.—"*Brechin Advertiser.*"

In accepting the facts in the above statement, I feel at liberty to differ from Mr. Sanderson in my conclusions. It has been conclusively shown in several articles in late numbers of the American Bee Journal, that the length of life of the worker bee is limited to one year; and that, during the honey-gathering season, the majority meet death in various ways incidental to all climates, namely high winds, sudden storms, birds, insects, &c., before four months old—I therefore conclude, from the short life of the worker bee, that it never loses "the instinct of hoarding honey for a winter that never comes."

The truth I feel assured is just here—man's mismanagement. The German probably managed his bees as commonly managed in his own country, or in some other way not suited to the latitude of Peru. If the size of hives were retained, the bees would soon fill them with honey to such an extent that the queen having but few empty cells to deposit her eggs in, it would be impossible, under the old *immovable* comb system, to keep up the strength of the colony. The mortality in such case would be greater, during a certain period, than the increase by births. We have here one of the evils of "over-wealth" as described by Butler. The remedy for this condition is to be found in the removal of surplus stores from the body of the hive, to make room for brood. This can be most readily done with the movable comb hive, which under every circumstance, by proper management, enables one to keep his stocks strong. A strong stock works with more vigor than a feeble one. With strong stocks there is no difficulty in securing as much honey, in one favorable year, as in another equally favorable, *winters omitted* or not, for any number of years.

When a hive is suffering from decreasing population, the queen not having a sufficient number of empty cells to deposit her eggs in, remove one or more full frames, and replace with empty frames. Space is thus given, and in the construction of the new comb, which is mostly done at night, the queen often fills the majority of the cells with eggs, and so eager is she, in discharging this duty, that she deposits eggs in rudimentary cells, the sides of which are afterwards completed. Even in this latitude, colonies some years suffer from the breeding portion of their hive being too full of stores early in the season. Such swarms enter upon the winter well provisioned, but contain too few bees to winter safely in the open air, and too few young bees to profitably carry on the spring labors of the hive. One bee hatched in September or October is worth two of an earlier date.

Mr. Quinby, of St. Johnsville, N. Y. (one of our most noted apiarians, whose name I have been anxiously looking for in this Journal since its first number,) thus writes in the August Number of the "Am. Agriculturist." "Beekeepers the present season, taking Montgomery County as a sample, will have a difficulty to contend with just the reverse of the one last year. The bees then obtained too little honey, this year too much, at least for their future prosperity. So great a portion of their combs will be filled with honey, that the number of cells left for breeding will be insufficient to keep the colony in its usual strength. This will be the case should there be no unusual change in the yield of honey this month. The remedy is at hand, for those having the movable combs. It is simply removing one or more outside, or any other combs that may be filled with honey throughout, and substituting empty frames or frames with empty combs. Make room for them near the middle, by moving those in the centre outward. The full combs can be set away, and given to any late swarms that do not obtain sufficient winter stores; or, if the colonies from which they were taken have not enough, they may be returned. When not wanted thus, save for the table."

In this latitude, when a swarm diminished in population by over-wealth, survive the winter, they start the new year with a fair prospect of success; the queen on the opening of spring finds thousands of empty cells at her disposal, and the colony is soon strengthened for the summer's work. Here the climate often corrects this difficulty; *there* man must apply the remedy.

The movable comb system has very great advantages over any other, in northern latitudes. In equatorial regions it becomes indispensable to success.

E. P.

☞The admirable industry of the bee is not to be ascribed to the acting of a free and separate will.—MALTE-BRUN.

The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. IX.

I purpose adding a few numbers involving theory only incidentally, and having a more direct practical application.

1. *In how many days from the time the egg is laid is a queen-bee fully developed?*

Without recourse to special experiments it is by no means easy to arrive at a satisfactory conclusion: though we may readily deceive ourselves and fancy that the queen matures in a shorter time than is actually required. In pre-constructed royal cells, the queen is rarely seen to lay (I, at least, never saw her do so;) and in post-constructed cells, we cannot know with certainty the age of the larva selected for the regal dignity. Thus the matter remains, in a large degree, one of doubt and conjecture. I made two experiments in the hope of settling the question.

On the 6th of July, 1851, at 11 o'clock in the forenoon, I introduced a small forced swarm in a hive containing, among empty frames, one filled with comb. At one o'clock in the afternoon I examined the latter, and found a considerable number of eggs in the cells. I then removed the queen, took out the empty frames, substituting for them others filled with comb, and placed the one containing the eggs against the glass side of the hive, so that I could conveniently watch the construction of the royal cells. Only three were built, all of which were still open on the evening of the 15th. At 5 o'clock on the morning of the 16th, two were closed—nearly ten days, consequently, after the eggs were laid; and at three o'clock in the afternoon, the third was also closed. This last was preserved by the bees, and the first two were destroyed by them on the 21st. On the 24th, at 10 o'clock in the forenoon, the remaining cell was still closed; but at two o'clock in the afternoon it was open and the queen had emerged. Hence the time required for the development of the queen, in this instance, was fully eighteen days.—A second similar experiment, made in 1853, furnished a slightly different result. The queen emerged in seventeen days. I neglected, in this case, to note the time when the cell was closed.

These experiments show that the opinion generally entertained, that the queens emerge between the seventeenth and eighteenth day after the eggs are laid, is correct. The results obtained when force swarms are made, also corroborate this; for, according to my observation, *teeting* is usually heard, in the parent hive, on the fourteenth day. Now, if we assume $2\frac{1}{2}$ days as the time required for the egg to hatch, and that the larva selected was $1\frac{1}{2}$ days old when chosen, we shall again have from seventeen to eighteen days as the time in which the queen matures. I have, indeed, frequently heard the *teeting* on the thirteenth day; occasionally, though rarely, not till the fifteenth; and still more rarely as early as on the twelfth. Dzierzon says he has heard it on the tenth; but this is readily accounted for by the varying age of the larva chosen, and is consequently entirely reconcileable with the normal period of from seventeen to eighteen days. I will only add, in passing, that the bees do not, as is commonly stated in the books, usually select a larva *three* days old, but in most cases a younger one. But whether they occasionally also select an egg for the purpose is an interesting query, to which, however, I have not hitherto directed my attention.

Dzierzon states (page 3 of his supplementary treatise), "in parent stocks, from which forced swarms had been taken, I have frequently found queens emerged on the eleventh day, though generally they appear on the twelfth or thirteenth, and are vigorous enough already on the fourteenth to accompany the afterswarm at the usual period." That my observations differ somewhat from this, is manifest from what I have stated above, and they constrain me to assume the fifteenth or sixteenth day as the normal period for the issuing of afterswarms. It is very possible that one of us is in error here, and the matter is a fair subject for future investigation.

In the first of my experiments the bees capped the royal cell on the tenth day, and eight days thereafter the queen emerged. I think (though I am not sure,) that I have not unfrequently noticed the capping of such cells several days sooner; and also that the queens emerged several days later. I trust that these points will yet be definitely ascertained by careful and reliable observers.

2. *Can the workers transfer eggs or larvæ?*

Dzierzon denies *in toto* their ability to do this. That they do not commonly do it, is evident from the structure of the post-constructed cells. Why should these have their peculiar form, if the eggs or larvæ were transferred into them? I could also adduce numerous instances in which it is certain that no transfer was made. But the question is whether they *cannot* in any case, make such transfer. This I am not prepared to assert, and must regard it as a topic fairly open for further investigation. I can only say that since

Burnens succeeded in transferring both eggs and larvæ from cell to cell, and I have myself transferred eggs in like manner without injuring them, (though my attempts to transfer larvæ failed,) I cannot but suspect that the bees may be equally expert. Besides all this, the Rev. Mr. Schiller, of Frömmstedt, who is a practical apiarian, thoroughly acquainted with Dzierzon's theory, related to me the following occurrence. One of his neighbors inserted a piece of comb containing eggs and unsealed larvæ in the *rearmost* comb of a hive, the colony in which had no queen and only capped brood nearly mature. The colony which was very small and clustered on the anterior combs, neglected to cover and nurse the inserted eggs and larvæ, and suffered it to perish. A week later, when the owner opened the hive for thorough examination, he discovered this fact, but was also surprised to find, attached to one of the *front* combs, a sealed royal cell from which a queen subsequently emerged. If this case is correctly reported, the question regarding the ability of the workers to make such transfers, must be considered settled. But as the observer was comparatively a novice in bee culture, it is possible that he may have been deceived. I purpose making some experiments next summer, which I trust will finally dispose of the controversy.*

3. *How old may a worker-larva be, and still be susceptible of development as a perfect queen?*

The current opinion, dating from the time of Schirach, is that a queen can only be reared from a worker larva not much more than three days old. Dzierzon, in his supplementary treatise, page 2, says—"I have noticed that worker larvæ, so far advanced that they nearly fill their cells, will still be developed as perfect queens, if before capping, the cell be somewhat enlarged and widened, and the larvæ supplied with the appropriate pabulum." Incredible as this at first seemed, I have found it is nevertheless true; as the following experiment, which I made last summer, conclusively shows. On the 10th of June, I took a worker comb containing eggs and larvæ in various stages of development, and cut out the cells in which were the eggs and the younger larvæ, suffering only the cells containing the older larvæ nearly ready for capping to remain. This left only forty-one open cells in the comb. I now fitted up a hive with empty combs, inserting the one thus prepared among them, and then introduced a forced swarm deprived of its queen. I set this hive in the place of the parent stock, and on the 23d I found four royal cells on the comb, which were so small and inconspicuous that I should not have observed them, had I not specially searched for them. They could scarcely be distinguished from common drone cells. I opened one of them, and the embryo had the appearance of a perfect royal nymph. The original worker cell retained its hexagonal form, so far as it had been filled by the unchanged larvæ, but the superadded portion was circular. The hive contained a considerable number of bees; but as I did not anticipate swarming, I concluded to let it stand till the worker brood matured. In this, however, I met with a disappointment, for on the 30th the queen issued with a swarm and the remaining bees soon after dispersed. The swarm throve finely, and towards the close of July young workers emerged from the cells. The queen was of fair average size—neither larger nor smaller than queens usually are.

4. *How do queen-bees emerge from the royal cells?*

It is commonly said that they sever the cap of the cell by a circular cut along its periphery, allowing it to adhere to the body of the cell by a narrow strip only, which serves as a hinge, and then crawl out. This is true, yet still not entirely correct. On the 25th of June, 1853, about ten o'clock at night, I heard a *teeting* in one of my colonies which had not yet swarmed, and also heard several *quahking* responses. The occurrence being somewhat unusual, attracted my attention and excited my curiosity. The tones were louder than those usually heard prior to the issuing of a second swarm, doubtless because the young queens were fully mature—swarming having been prevented by a protracted spell of rainy weather. The queens may, besides, have all been of nearly the same age, the old queen having probably been undesignedly removed some time before, in the course of some operations I had made. Early next morning, with the assistance of Günther, I took out comb after comb, to secure the queens which had not yet emerged, by removing the royal cells. We found one queen at large, and ten others still confined, though fluttering and *quahking* occasionally in their cells. Günther took charge of the comb on which the emerged queen was found, which was well covered with bees, whilst I undertook to seach for and remove the still closed royal cells. The emerged queen continued *teeting*, precisely as though she were still in the hive, and Günther reported that she crept about slowly on the comb, endeavoring to conceal herself among the workers, and *teeting* at brief intervals. When uttering these sounds, she stopped, turned her head downward, fixing herself firmly to the comb with her fore feet, and

*The results of these experiments will be given hereafter.—Ed.

appeared also to press her abdomen against the comb—though this could not be distinctly observed by him, as she was constantly surrounded by a crowd of bees. Her wings remained entirely motionless. The emission of the sounds evidently required a considerable effort, as her abdominal rings became visibly distended and diverged. It was obvious, however, that she did not produce the sounds, as Gundelach supposes, by an attrition of the abdominal rings against each other, but by a forcible expulsion of air through the tracheæ. Thus far Günther. I could only observe that, when teeting, she cowered very close to the comb, and that the abdominal rings, though only slightly moved, were still shoved somewhat over each other. I observed this when Günther held the comb before me, while I was occupied with the royal cells, and hence could not make as minute an examination as I desired. While in the hive, the teeting queen (which is the only one at liberty,) runs rapidly to and fro on the combs; and I noticed frequently that such a queen then, too, endeavors to hide herself among the bees. I have often also seen her perched on a still closed royal cell.

Of the queens still enclosed in their cells when we opened the hive, seven emerged in about eight minutes, and I caught and confined them as they came forth. In one of the cells which I held in my hand, and in which there was much fluttering, I saw the queen suddenly pass one of her mandibles through the feeding and breathing aperture of the cap, and almost instantly emerge after making a circular cut along the margin of the cap. She obviously turned herself round during the operation, but did not cut the cap entirely off. It still adhered to the cell by a slight slip or band, and being pushed forward as the queen crawled forth, it at once fell back and closed the orifice when she had fully emerged. Her mandibles must be exceedingly keen cutting instruments, and her strength great, or she could not perform the operation so expeditiously. A worker could not accomplish it.

I placed two of the newly emerged queens under a bell-glass. At first they simply crawled about, seemingly unconcerned, on the inner surface of the glass; but they soon met and engaged in combat. They seized each other with their feet and mandibles, rolled about, struggling like two contending workers, and one of them was speedily dispatched. Two others, also placed under the glass, acted exactly in the same manner. This was the first opportunity I had to witness a combat between queens; and I did not before place much reliance on the accounts I had read of such combats, because in my previous experiments the queens did not attack each other, but remained peaceably together. Those experiments, however, were made in autumn, when I united colonies; and it did not then occur to me that queens are not at that season particularly hostile to each other—as is evident from the fact that two have occasionally passed the winter in one hive. This is a fact which I have observed myself, and which has been fully verified by both Gundelach and Dzierzon. During the summer there is ever only one queen at large in the colony, and she is the one from which the sounds *teet, teet*, proceed when young queens are reared and are nearly mature. Hence this sound is always heard singly, as proceeding from one individual; whereas when several embryo queens are maturing simultaneously, the *quahking* may be heard proceeding from several places and different individuals. This is certainly the fact, though some careful observers have been deceived. Deception may easily occur even where a large glass hive is used and the teeting queen is seen on the comb. She is very rapid in her movements, and frequently after teeting disappears for an instant, teets when out of view, and instantly returns—leading us to fancy that the sounds proceed from different queens.

On the whole, I conceive that in the hives, ninety-nine queens out of every hundred destroyed, are killed by the workers, for one that perished in combat with another. Queens cannot, indeed, readily get into conflict, because when two chance to appear simultaneously in a colony, one or both are immediately surrounded and imprisoned by the bees. *Royal combats are the exception.*

5. *Why do queens teet and quahk?*

It is commonly and correctly said that they do so from *jealousy;* but treatises on bees do not furnish clear and satisfactory evidence of this; and the assertion that, till one queen has emerged and begins to *teet*, *quahking* is never heard in a colony, is certainly erroneous. It is supposed that the queen which first emerges *teets* when she becomes aware that rivals are concealed in the royal cells; and the still confined queens *quahk*, because they hear the teeting of the emerged one, which fills them with apprehension, and induces them to remain in their cells. Two observations which I made this summer, satisfied me that this view is not altogether correct. I found that the mature young queen (even if there be only one in the hive) always *quahks* for a time, in her cell, before she emerges and teets; and it seems natural that she should do so. In the early part of July,

I removed the queens of ten colonies, partly that the old might be replaced by young ones, and partly to ascertain whether the young queens, returning from their hymeneal trips, would readily find their respective hives when these were purposely placed close together; though my chief object was to check for a time the enormous production of brood and encourage the accumulation of honey. I immediately inserted a sealed royal cell in the hindmost combs of each hive, opposite the glass end, that I might conveniently watch the emerging of the queens. I examined them daily, and one evening distinctly heard a queen quahk. I ascertained that the sound proceeded from the still closed royal cell. I listened more than an hour, during which time the quahking was repeated at intervals; then the queen emerged and the quahking ceased. I intended to examine the hive thoroughly next morning, but when Günther and I arrived, we heard queens quahking in two other hives. At six o'clock, one of these emerged from her cell, and silence ensued. The other issued soon after; the workers cleaned and fed her; she then passed on to some of the inner combs, and we immediately heard her teet. This sound was frequently repeated, and we noticed that there was no quahking in response. We then took out comb after comb, and found six royal cells, some of them recently capped and others still open. Though they had been furnished with a sealed royal cell, the workers had started others in addition, in some of which the emerged queen apprehended rivals might be concealed, and therefore commenced teeting. There could, however, be no response, for all the embryos were still immature. We likewise examined the other two hives, containing the emerged queens, which had quahked before they left their cells, but did not teet. We found no royal cells in either of them.

From these observations, it is evident that young queens teet and quahk from sheer jealousy; and that every queen, before emerging, quahks for a time, *to assure herself that no rival is at large in the hive.* Not till after her reiterated calls have remained unanswered, does she feel herself safe, and release herself by severing the cap of the cell.

It has sometimes been alleged that old fertile queens never teet. Yet when making artificial swarms, and in other operations where much smoke was employed, I have occasionally heard old queens teet. On such occasions it seems to be an expression of alarm and anxiety. But the old queen will teet also, when, in a colony ready to swarm, but detained by unfavorable weather, the embryo queen becomes as far matured as to be able to *quahk* before the swarm departs. In such cases the old queen is not always killed, or the young one torn from her cell, as the books tell us. I will cite one instance. In 1845, I heard both teeting and quahking in one of my colonies, from which no swarm had yet issued; and when the swarm left, the old queen dropped to the ground, being unable to fly. I carried her to the swarm, and after hiving, set the hive on a blackboard. Eggs were soon dropped on the board, showing conclusively that the queen was an old and fertile one.

(For the "Bee Journal.")

LARGE NUMBER OF QUEEN CELLS.

A strong stock of Italian bees deprived of their queen, being examined twelve days after, contained twenty-six perfect queen cells. A well-developed queen had just emerged from one of these cells; and three more hatched before the queen cells were removed and given to other colonies. The next day, all but six of the remaining queens had hatched; and only one of these six hatched at all. All these queens, with one exception, were of full average size; and although the hive contained an abundance of eggs, the bees evidently preferred to rear their queens from larvæ.

A colony of black bees being deprived of their queen, a sealed Itailan queen was given to them, and on examination two days later, the queen had hatched, and fifty-five incipient queen cells were found. These were all empty, and it is not probable that under any circumstances the bees would have perfected all of them.

The twenty-six queen cells above referred to, and most of these fifty-five, were on the bottom of the combs, the bees preferring this position as the one involving the least interference with the brood.

A nucleus, well supplied with bees, being deprived of its queen, had three royal cells given to it; and yet in a few days they had ten more under way, and four days later six more—all of which were completed.

Bees appear to be very capricious as to the number of royal cells they will build; strong colonies, in the height of the swarming season, often refusing to make as many as small nuclei. When a colony is greatly agitated at the loss of their queen, I have usually found them to build the most.

Oxford, Ohio. L. L. LANGSTROTH.

GERMAN ADAGE.

He who hath thriving sheep in his fold,
Whose wife is not given to bluster and scold,
Whose bees are aye wont to swarm in due season,
For grumbling and growling hath surely no reason.

(For the "Bee Journal.")

Wintering Bees.

I wish to inquire through the Bee Journal (with which I am well pleased), as to the best method of wintering bees—the most difficult thing about bee-keeping, I think; or at least one of the most difficult. For two winters past I have kept my bees in a cellar; but those in Langstroth hives suffered sadly from the dysentery, whilst those in common hives were not at all affected, and very few bees died. But in the Langstroth hive they died off in great numbers, so that in the spring the stocks were very weak. This was the first winter.

Last winter, all the stocks, old as well as new, suffered from dysentery. Still, very few bees died in the old hives, but great numbers perished in the new. The first winter only the holes in the honey-boards were left open, but last winter the honey-board was entirely removed.

Now, if you, or Mr. Langstroth, or any one else, can tell why bees should die off so sadly in the Langstroth hives, whilst scarcely a bee dies in the common chamber hive, I would thank you to do so. In every other respect I like the movable comb hive much, *very much*.

It is stated in the June number of the Bee Journal, that "young queens do not usually make their hymeneal excursion until the eighth day after leaving their cells," while Mr. Langstroth says that "they leave the first day after being established as heads of independent families." "Who shall decide when doctors disagree?" Last year a queen left an observing hive on the afternoon of the second day after leaving her cell. Should like to see this question settled, if it can be.

BENJAMIN KING.

Raynham, Mass., Aug. 3, 1861.

[For the Bee Journal.]

THE FERTILITY OF THE QUEEN.

On page 109 of the Bee Journal, will be found an article, over my signature, in regard to "the fertility of the queen." I proposed, during the past season, to experiment on a plan entirely new, that the fertility of the queen might be approximately ascertained, and others were requested to experiment in a similar manner. I regret to say that circumstances have prevented me from experimenting as therein designated, or in any manner whatever. If others have done so, or have any *facts* to present in regard to the fertility of the queen, the writer especially would be pleased to hear from them through the columns of the Bee Journal.

M. M. BALDRIDGE.

Middleport, Niagara Co., N. Y., 1861.

[For the Bee Journal.]

ONE YEAR'S EXPERIENCE WITH THE ITALIAN BEES.

For the benefit of the readers of the American Bee Journal, I give my experience with the Italian bees this season. In the fall of 1860, I received an Italian queen, which was, of course, too late to raise queens. I therefore had but one colony this spring. I examined them frequently early in the season, and found them more industrious than the common bees, and also having more brood. On the 28th of May, coming home in the evening, I noticed a group of bees, numbering about two dozen, at one of the posts of the stand. I examined it and, behold, found the Italian queen among them. It seemed strange to me, for I did not expect any swarm at this time, as the weather was very unfavorable, particularly through the apple-blossom period. I examined the stock at once, and found queen cells, containing brood, though not finished. It was then plain to me that the bees had swarmed and the queen could not fly, I suppose on account of her burden of eggs, and had crawled up the post where I found her. I then removed a comb to start nuclei. The bees then destroyed the queen cells. On the 10th of June, I again removed a comb and found finished queen cells, which were again destroyed in consequence of the removal of a comb. I now removed the stock to an isolated place, in order to rear pure queens. On the 22d of July I again examined them, and found they had made preparations to swarm. I feared they might swarm, and no one be on hand to hive them. To remedy this I made an artificial swarm again, removing combs from the old stock (my hives contain 11 combs). Both colonies are now (Aug. 10th,) filled to overflowing, and the young stock has made preparations to swarm; at this time the old stock has also made some eight pounds of surplus honey. I am aware that greater profit has been realized from one stock, even with common bees, in a good season. But as this is a very unfavorable season with us, even worse than the last one, it is more than the common bees did. Not one stock in twenty has cast a swarm. We had no rain of any account since the 1st of June.

New Berlin, August 12, 1861. R. B. O.

☞ It is stated in Vogt's Zoological Letters, that the earliest traces of petrified hymenopterous insects are found in the Upper Jura limestone; and in much greater abundance in the fresh water strata of the tertiary formations. In the latter, the ants figure most prominently. The remains of other hymenopterous insects are more rare, especially those of honey-gathering tribes. This accords altogether with the limited development and distribution of herbaceous plants and flowers in the tertiary period.

[For the Bee Journal.]

Kirby's Theory

ON THE PROPAGATION OF BEES.

After a careful examination of Mr. Kirby's Theory, I am unable to see that he furnishes any *proof* that "the workers in their flight with the drones alight on the drones' backs,* and cause them to give off their semen, which the workers lick up and carry to their appropriate cells in their hives, for the purpose of propagating the young queens." In twenty-five years I have never seen a drone and worker falling to the ground together, and the worker busy in licking up the seminal secretions of the dead drone; nor have I ever heard of any one who has seen anything of the kind. If Mr. Kirby says that as few drones are used for this purpose, that it is not strange the process has not been seen, he not only admits that he gives us only *conjecture*, but his theory fails entirely "to account for the cause and use of so many drones."

That the workers greedily lick up the seminal matter of *crushed* drones, I have known for many years; but this is no *evidence* that they use it for impregnating the royal larvæ. If Mr. Kirby will crush some drone larvæ, in whose organs, according to his own views, the semen is not "ripe," he will find that the workers will greedily fill their honey-sacs with the milky juices. If he should infer from this that the seminal fluid is ripe sooner than he supposed, he will find that crushed *worker* larvæ are equally acceptable to the bees.

Mr. Kirby says—"The worker takes the semen thus obtained and impregnates the embryo worker-larvæ in royal cells, which fecundates the ovary of the immature queens in order to give life to her drone progeny. She then comes forth fully prepared to lay eggs that produce drones only." Is Mr. Kirby aware that queens which have had no intercourse with a drone, seldom lay any eggs at all? Or, will he say that those which do not lay were not impregnated by the workers in the larvæ state? But this will not account for the fact that, while almost every flying queen, in the season of drones, becomes able to lay both worker and drone eggs, of those whose wings are imperfect, or which are prevented from leaving the hive, only now and then one becomes a drone-layer.

I must entirely dissent from Mr. Kirby's assertion, that Dzierzon and Prof. Von Siebold, in their theories as to the production of drones without the male sperm, are not giving the true history." The Professor has *proved*, by actual dissection, that eggs producing drones have none of the spermatic filaments, such as are found in those producing workers—and that queens producing such eggs only, have no seminal matter in their spermathecas; indeed, in one instance, such a queen, dissected by Dr. Barth,* had no spermatheca.

Mr. Kirby conjectures that these drone-laying queens *had* (I wish to be as indefinite as Mr. Kirby, who hazards no conjecture *how* this semen is applied,) semen gathered by the workers. Even if he could *prove* the truth of this surmise, it would only show, not that those eminent observers have not, as far as they have gone, "given the true history; but that they have failed to discover *all* the facts, and that "the generation of bees," which so puzzles the profound intellect of Aristotle, is even more anomalous than the advocates of parthenogenesis have supposed it to be.

Thus far I have attempted to show that no *proof* has been given of the truth of Mr. Kirby's Theory. I will state some facts which go far to dispose of it. In the spring of 1860, I reared a number of Italian queens, which were beautifully colored, (and whose drones have proved to be pure,) not only in combs built and occupied entirely by black bees, *but before any Italian drones had been reared.* To fully satisfy Mr. Kirby, I will give a black queen to an Italian nucleus, whose combs have been built and occupied by Italian bees, in my apiary, where tens of thousands of Italian drones are flying; and after she has deposited eggs in these combs, she shall be removed and the young queens when sealed over shall be taken to an apiary of black bees, five miles distant from any Italian stock, to be impregnated. I have no doubt that their progeny will be black bees, without the slightest trace of Italian blood.

Many readers of the Bee Journal may consider it a waste of time to attempt to refute Mr. Kirby's Theory—regarding it as a matter of no practical importance, whether it is true or false. But let such persons remember that, if true, it will require us to make important changes in our methods of breeding Italian queens.

Oxford, Ohio. L. L. LANGSTROTH.

* In the Bee Journal for July, Mr. Kirby objects to a statement in Mr. Carey's letter in the March Number. Mr. Otis, one of the observers referred to in that letter, has since informed me that the relative position of the queen and drone was such as Mr. Kirby assumes it must be. Prof. Von Seibold has noticed this fact in his work on "Parthenogenesis." Inferring from Mr. Carey's letter, that the drone was active and the queen passive, the plan devised of tying the queen is unsuccessful, as she is too much hampered to seek the drone. It might, however, *occasionally* succeed, as in the case mentioned by Mr. Shrimplin, *Bee Journal*, page 66.

* This dissection was made in March, 1852. In the summer of the same year, without being aware of what was doing in Europe, I furnished a drone-laying queen to Prof. Joseph Leidy, of Philadelphia, who found her "spermatheca distended with a perfectly colorless, transparent, viscid liquid, without a trace of spermatozoa." These dissections first put the Dzierzon Theory upon the basis of perfect demonstration.

[For the Bee Journal.]

Kirby's New Theory.

If Mr. Kirby's ideas about the manner in which bees effect "the propagation of young queens" were correct, it would be impossible to preserve the Italian race pure, by any expedient, in a place where common bees are kept, and the workers have none except common drones *to operate* on. On his theory, all the progeny of an Italian queen so situated, must infallibly become *hybrids*. There is nothing more certain, however, than that she will, even under such circumstances, continue during life to produce pure stock; and that a young queen reared from her eggs will produce genuine Italian stock, if before fecundation she be removed to an apiary where she must necessarily have concourse with an Italian drone. She may be returned, as soon as fertilized, to her native locality, with all its contaminating surroundings; and all the seminal matter supposed to have been collected in her maternal hive, and used by the workers in "propagating" her, will be found to have had no more effect to deteriorate her than would so much water. If it had been used, it ought to have produced some effect; and that effect, according to all analogy and experience, could only have been to *hybridize* the progeny. As no such result follows, the unavoidable inference is that the supposed material which alone could be competent to effect it, (and which had it been so used, must necessarily have effected it, if it had any effect whatever,) had not been employed by the workers, in the process of propagating her.

If the young Italian queen reared under such circumstances, where the process supposed by Mr. Kirby to be the true one, would have full play, be retained in an apiary, where no Italian drones exist, and in a district where no other bees of that race had been introduced, and she be fecundated by a common drone, her worker progeny, whatever be their outward seeming, will prove to be *hybrids*; but she will to the end of her life, produce *genuine Italian drones*, and such *exclusively*. How could this be, if Mr. Kirby's Theory had the slightest foundation, since according to it, all the fertilizing matter employed was derived from common drones? Mr. Kirby says—"The worker takes the semen thus obtained [from the drones] and impregnates the embryo worker-larvæ in the royal cells, which fecundates the ovary of the immature queen, in order to give life to her drone progeny. She then comes forth fully prepared to lay eggs that produce drones only." But how comes it, then, that a young Italian queen reared as above, produces genuine *Italian* drones only, if the seminal matter by which her ovary was fecundated, while she was yet immature, in order to enable her to produce drones, was derived by the workers from *common* drones exclusively? The result should, on this theory, be precisely the reverse of what ten years' experience and hundreds of experiments show that it actually is.

Let Mr. Kirby try the experiment himself, with all imaginable precautions and all conceivable variations, and he will find that a queen reared from the eggs of a pure Italian queen introduced in a hive containing common bees exclusively, in an apiary or district where no Italian bees exist, will produce genuine Italian stock, if fecundated by an Italian drone; and will continue to produce such stock exclusively during life, though he may have millions of common drones in his apiary, every year, from the time the egg from which she was hatched was laid, to the day of her death. This clearly could not be so, in accordance with his theory, since during the entire period, there would not be a particle of seminal matter from *Italian* drones procurable by the workers.

Moreover, we have frequently, in common with those who practise artificial multiplication of colonies, reared queens from eggs and larvæ taken at hap-hazard from the combs containing them; and the queens reared, after fecundation, proved to be as prolific and perfect as any bred in the natural way. Now, unless Mr. Kirby supposes that the workers impregnate with semen not alone "the embryo worker-larvæ in the royal cells," but *all* the larvæ in the worker cell likewise, must it not have been by "a most remarkable concurrence of fortuitous *accidents*," that we always happened to light on such larvæ as had been prepared for the transformation? This, more especially when larvæ *six days old* were taken? The regular recurrence of this in very numerous instances, must either be regarded as a fact putting a new phase on the entire "doctrine of chances," or force us to the conclusion that the seminal matter *supposed* to be stored up in the cells, (*should any ever be found there*,) is designed for some more general purpose than simply that of being used for "the propagating of young queens;" for tens of thousands of workers are bred in colonies in which not more than one or two queens are reared in a season in the natural way, and even in many, where none are reared.

Instead of explaining what to him, seems a mystery in the reproduction of the honey bee, and giving us the "true history," which Dzierzon and Prof. Von Siebold are alleged to have missed getting at, Mr. Kirby only originates a profounder puzzle. A brief experience in the rearing of Italian queens, will convince him of his error, and satisfy him that his theory is untenable; though it may fail to convert him to that of others.

L. P.

[For the "American Bee Journal."]

Who will Explain the Mystery?

One of my beekeeping friends, the past season, divided a colony of bees as follows: three of the central combs, with the adhering bees, containing an abundance of brood in every stage of development, were selected and transferred to an empty hive. The vacancy in each hive was filled with empty comb-frames; the parent colony was moved a short distance to a new location, and the new one placed on its stand. The old queen was permitted to remain with the parent colony. A large number of bees returned to the parent stand, so that the new colony was very populous. The queenless colony soon commenced operations to supply themselves with a queen. In the meantime, as the honey season was very favorable, they gathered large stores of honey and, consequently, built considerable comb. They filled all the frames nearly with comb, which, of course, was principally of the *drone* or *store* kind. By the way, allow me to state, that this method of dividing bees is wrong; the old queen should have been given to the new colony—*worker* instead of *drone-comb* would then have been constructed. Instead of taking *three* combs from the parent colony, only two should have been taken; the combs in the parent colony ought then to have been moved from either side towards those on the other, and the empty frames put into the side of the hive left vacant. It would then have been good economy to have supplied the parent colony with a royal cell having a queen nearly mature. There are objections to this mode of dividing bees even when the foregoing precautions are strictly observed. Space, at this time, forbids my entering into particulars as explanatory of the objections. I trust that I may arrest attention, however, by stating that the best mode of division yet originated, in my opinion, is very similar to that advocated by S. C. Brown, on page 137 of the Bee Journal. That method is *practical;* can be practiced with the best of success *by nearly all classes of beekeepers!*

We will now direct our attention to the divided queenless colony under consideration. Nineteen days after the division, myself and others made an examination and found the young hatched queen. She was apparently in good condition; there was no indication, however, that she had, as yet, been impregnated. A frame of newly made *drone-comb* was then taken out for inspection, when to our surprise we found a *royal cell, nearly ready to be sealed, containing larva!* After a diligent search, we found there were no eggs nor larvæ in the hive, aside from the larva in the royal cell. This cell was constructed on the *side* or *surface* of the *drone-comb.* The inquiry was then made, how came the egg, from which the larva in the queen cell originated, deposited in the *drone cell?* I do not propose to give a decisive answer to this inquiry. In my opinion, it would be very imprudent to do so. As the problem in question is of a very interesting nature, I trust I may be justified in making a few *conjectures.* Circumstances were such that it is not known whether said larva would have matured as a *queen* or a *drone.* Had it matured as a drone, probably the egg was deposited by a *fertile worker;* but, as a queen, it might possibly have been *transferred to the drone cell from some other colony standing near!* It is well known by those engaged in the propagation of the Italians, that the bees are frequently found passing in and out of neighboring *native* colonies without the slightest molestation I presume, if the fact were known, that the native bees pass in and out of the hives of each other in a similar manner; if so, it seems to me that it would not be an improbable occurrence should they, in visiting their neighbors, instinctively prepare for an emergency, select an *egg* and transfer it to their own domicile. It seems to me, however, had the egg been transferred, that their instinct would have taught them to have deposited the egg in a *worker cell.* It would, probably, have made no difference in regard to the successful rearing of the larva as a queen, as the egg selected would very likely have been from a worker cell, and, of course, properly fertilized. Who will propose a better solution to this interesting problem, or, in the words of the heading to this article, "Who will explain the mystery?"

M. M. BALDRIDGE.

Middleport, Niagara Co., N. Y., 1861.

☞Young queens make their excursions only while the bees are disporting in front of the hive, and the joyous humming then heard is supposed to prompt or rather allure them to issue. Though the weather be calm and warm, and in all respects favorable, they leave at no other time.

☞The old notion that drone eggs are developed periodically only in the queen's ovary, has long since been exploded. So also the conceit that drone eggs proceed from one branch of the ovary and worker eggs from the other.

Colonies which have royal cells so far advanced as to be capped, cease building comb for a time.

Bee Culture in Common Hives.

No. III.

BY F. W. GUNDELACH.

Colonies which are populous and in good condition in the fall, or were properly strengthened and duly provisioned then, will generally be ready for swarming by the middle of May, or towards the close of that month. Such is the case when the bees have so multiplied that there is no longer sufficient room for them in the hive, and the cells are almost exclusively filled with brood. Many of them will then be constrained to cluster outside during the night. Want of room thus excites in them the disposition to swarm; royal cells are built, and these are usually capped at the close of the eighth day, or early on the ninth—the enclosed larvæ being then ready to pass into the pupa state.

If the weather is favorable and pasturage plentiful, the swarms will issue at about this period, and commonly leave between 9 o'clock in the morning and 3 o'clock in the afternoon. They generally cluster on some neighboring tree or bush, and are then ready to be secured and hived. If the process were always uniform and so simple as here sketched, it would, in most seasons, be sheer folly to be at the trouble of making artificial swarms. Unfortunately this is not the case. Thus if, after the royal cells have been capped, continuous rainy weather should occur, or if pasturage should suddenly fail, bees lose their swarming propensity and destroy the royal cells; and though, from want of room, they continue to *hang out* for days and weeks in succession, no swarm will issue. The drones, indeed, will be retained, and if as numerous as they frequently are, in the spring, in common hives, they and the involuntarily idle workers will consume a large amount of stores.

But, though the swarm, accompanied by the old queen, take its departure, the result is not always as satisfactory as was anticipated. "There's many a slip betwixt the cup and the lip!" It sometimes happens that the old queen, unable to fly, falls to the ground and is lost. The bees still settle in a cluster, and the swarm is quickly hived. But the workers soon discover that the queen is missing, and incontinently "take French leave," hurrying back in hot haste to the parent hive. Many bees are always lost on such occasions, and if the old queen be not afterwards found, or the apiarian does not know what use to make of her if found, the resulting disadvantage is very considerable, for in the spring a fertile queen is nearly as valuable as a swarm. These risks are avoided, when forced swarms are made, besides saving the necessity of long and anxious watching for the departure of first swarms, about which there is always great uncertainty. My apiaries have always been situated more than a mile from my dwelling, yet in the thirty-five years during which I have kept bees, I have not lost a single swarm. I have prevented such loss by regularly driving out the first swarms every spring, and then awaiting the coming of the second swarms, the issuing of which can always be foretold with reasonable accuracy.

From these considerations, I prefer forced to natural swarms, particularly because they involve so much less trouble and anxiety than the watching, securing, and hiving of natural swarms. I usually drum out a half dozen swarms in the course of as many hours, always selecting the most populous stocks for the first operations. It is not necessary to wait till the bees begin to cluster outside in large numbers. I regard a stock as *ripe* for driving when, on lifting the hive at dusk in the evening, I find the bottom board well crowded with bees, being then satisfied that there is no longer sufficient room for them between the combs. I then commence operations, continuing the process at intervals of from two days to a week, according to the number of stocks I have, and the condition in which they respectively are. On the preceding evening, I raised the hive slightly from the bottom board by inserting three or four thin wooden wedges, elevating it high enough to allow a free passage for the air all around, but not so high as to permit a bee to pass out. The ventilation thus effected reduces the temperature of the hive during the night, and the bees consequently withdraw from the bottom board. The driving is undertaken next morning, or at any convenient time on the following day; and as my method does not differ essentially, in any respect, from that generally adopted, and frequently described in bee-books, I will not go into details here.

When the queen promptly accompanies the expelled bees into the upper or receiving hive, the whole operation may be finished in from twenty to thirty minutes. But as she sometimes fails to do so, I will mention the means I use to secure her expulsion. I mix equal parts of oil of turpentine and oil of rosemary in as much pure alcohol as will dissolve it without becoming more than slightly milky or discolored. Of this mixture I pour fifteen drops in the bowl of a new clay tobacco pipe, the stem of which I insert in the hive through a gimlet hole close to the now

inverted top ; and then surrounding the bows with my lips I breathe gently through the pipe, thereby diffusing the fumes and odor of the mixture through the hive. If gentle beating of the exterior of the hive be then resumed, the queen will in almost every instance immediately join the forced swarm above. If on separating the hives, the bees remain quiet and contented in the new one, for half an hour before it is placed in the apiary, we may conclude that the queen is among them. Or, if the queen is fertile, we may speedily ascertain her presence, by setting the hive on a blackboard. If she is in the cluster, eggs will soon be seen on the board, as there are in the hive no cells in which she could deposit them. As soon as I find eggs on the board, I carry the new colony to the place where the old stock stood, setting the latter in some other spot. But I prefer, when it can be done, to replace the parent stock on its old stand, and sending the new colony to a new location at least a mile and a half distant from my apiary. Repeated trials of both modes have satisfied me that this is the best.

If eggs are not found on the blackboard in the course of fifteen minutes, I replace the receiving hive on the parent stock, introduce another dose of the mixture, and recommence beating or patting gently. If after this I still find no eggs on the board, and the expelled bees remain quietly clustered in their new hive, it is probable that they have a young and still unfertile queen, and the better course will be to reunite the bees. This, however, will scarcely happen in one case in a hundred, in May.

If circumstances constrain me to retain the driven swarm in the apiary, I either set it where the parent hive stood, removing the latter to some other place—which is the least troublesome, and for a new beginner the safest method ; or I place it at the side of the parent stock. In the latter case, after being satisfied that the queen is with the swarm, I set the hive for a few minutes, where the parent stock stood, after removing the decoy hive, so as to give the stragglers an opportunity to join the swarm; and then carry it to a cool, dark cellar, where I leave it till the evening of the next day, having first closed the entrance to confine the bees, and given them air by inserting a thin wedge between the hive and the bottom board. I then replace the parent stock on its stand, to receive any bees that may still be out. The workers, missing their queen, will almost immediately begin to construct royal cells, and will by morning be fully reconciled to their orphanage. Next evening, at dusk, I place the driven stock at its side, and open the entrance. Should I find in the course of the following day, that a large number return to the parent hive, I move this six or eight inches further to one side, bringing the swarm nearer to the old location, and continue this till I find that a strong colony remains with the queen—which can generally be properly adjusted in a day or two.

In from twelve to fourteen days the young queens reared in the parent hive will be mature. Usually only one of them leaves her cell and by her *teeting* restrains the rest from emerging, though by their responses (*quahking*,) they announce their readiness to come forth.—Some writers recommend the driving out of the second swarms also, with a view to secure the supernumerary queens, to be used in making artificial colonies. I cannot advise it to be done, because it is an exceedingly troublesome task to seek for the queens among a mass of bees; and we, moreover, incur the risk of exposing the parent hive to queenlessness. It is, besides, not possible always to make an artificial colony, in this manner, without confining the bees at least twenty-four hours, for we may not happen to give them the queen which had first emerged, and to which they had become accustomed. And how little they are disposed to receive and acknowledge a stranger, may readily be discovered by removing a strong stock from its stand, and placing there an empty hive with a queen confined in a cage. The returning bees will course about rapidly and anxiously in the hive, hurrying around and over the cage, wholly regardless of the imprisoned queen. They will seek everywhere for the one to which they have been accustomed, and failing to find her, will finally desert the place, dispersing and entering other stocks, rather than accept the offered queen. But if, when a swarm issues naturally, the queen happens to fall to the ground, and the bees return to the parent hive, we place her in a cage, suspend it in a hive and substitute this for the hive from which the queen issued, the result will be essentially different. The returning bees will at once collect and cluster about the cage, in all respects like a natural swarm, simply because they recognize and acknowledge the queen. Second swarms are notoriously more restless and discontented than first swarms, and it is merely because they feel a less ardent attachment to a young and yet unfertile queen. If teeting has been heard for several days before the second swarm issues, the bees will manifest a less discontented temper, because they have meantime become somewhat accustomed to their queen.

For these reasons, I disapprove of driving out second swarms and never practise it. But I

every season rear a number of reserve queens in nuclei, so as to have them in readiness when needed to supply queenless colonies. This I regard as highly essential to successful bee culture in a large apiary. Long experience has taught me that of every ten young queens which leave on their wedding trip, one is certain to be lost; and I therefore endeavor to have on hand one reserve queen for every eight yet unimpregnated queens in my apiary. It is always a waste of precious time, and most generally a bootless labor, to impose on a queenless colony the task of rearing a queen from inserted worker brood, as a long period must elapse before young workers make their appearance to reinforce the ever-diminishing population, and the season passes before the colony recovers.

[For the Bee Journal.]

NEW MODE OF HIVING BEES.

Does not the new method of hiving bees, as recommended by Mr. Langstroth in the August number of the Bee Journal, involve an unnecessary amount of labor? I see no necessity for moving either of the hives, or for covering the parent stock with a sheet. My hives are arranged beforehand, sometimes two weeks before the swarms are expected. They are placed where they are intended to stand permanently, and the hives as well as the frames are plumbed with a plumb-line, from side to side, allowing about a couple of inches descent from rear to front. When the swarm issues, the queen having her wings clipped will be found very near the front of the hive, generally surrounded by a cluster of bees from the size of an egg to that of a peck measure, so that there is no difficulty in finding her. I take her up gently and place her in the top of my hiving box, and then either shake the bees into the box, or, if they have settled too high for that, I elevate the box on a pole, and hold it near the swarm. When they have all entered, I take them to the hive prepared beforehand, and empty them on a sheet at its entrance.

With my present experience, I am inclined to prefer allowing bees to swarm naturally, subject to the above restrictions, if they will do so. When they are strong enough to swarm and will not, the case is different. I always endeavor to secure at least one good comb for the centre of the new hive, for the queen to commence laying in, without having to wait for new comb to be built. I also remove the queen cells from the parent colony, or the young queen if she has hatched, and give it a fertile queen from a nucleus, giving the nucleus a queen cell in exchange.

Hulmeville, Pa. C. W. T.

[For the Bee Journal.]

TO PREVENT ANTS FROM DISTURBING BEES.

Mr. Editor:—I hear a great deal of complaint of ants disturbing bees, and occasionally inquiry is made as to the best remedy; but have not seen or heard of any remedy so certain to "head" the little intruders, as a simple plan which I adopted five years ago in my apiary.

It is this:—I make benches of 1½ inch boards, having the feet to project out, but very slightly, so as to prevent being easily blown over. I decide where the bench is to stand, and see where the feet will come, then put narrow boards crosswise for the feet to rest on. Under each end of these boards, I sink a block of wood or a stone, so that it shall not settle in wet weather. Then place the feet in tin, earthen, or iron vessels, (no matter how rough; even old oyster cans will do,) and fill with water about once a week. See that the bench does not touch any other thing having connection with the ground.

I brought in from the country this spring, two hives of bees (Hall's patent), set them on one of the above described benches in my bee house, and in a few days opened the upper doors to inspect the honey boxes. I found in and around the boxes, thousands of big black ants and eggs. I brushed them out for two or three days in succession, and since then not an ant is to be seen in them, or in any other hive in the apiary.

Marion, O., Aug. 5, 1861. T. J. Magruder.

[For the Bee Journal.]

About the middle of May, I transferred a colony of bees to one of Langstroth's movable frame hives, and for about three weeks they appeared to do well. About the middle of June, they commenced killing the young bees—apparently perfect and active bees. They pulled them out of the hive, and some they killed and dropped in front of the alighting board; others they carried away.

I have examined the hive and have found nothing the matter. They have built considerable new comb, the greater part of which is filled with brood. They are free from worms also. As they have about quit working, I fear they will go down entirely, unless something can be done to stop the murdering of their young. I hear several bee-keepers in this vicinity complaining of the same trouble with their bees.

Any information through the Bee Journal, as to the cause of this difficulty and a remedy for the same, would be gratefully received by a young beekeeper.

J. S. Martin.

Flat Rock, Ohio, July 13, 1861.

[For the Bee Journal.]

Does the Swarming Impulse proceed from the Queen, or from the Workers?

A nucleus well supplied with bees and honey, and having a queen a week old, deserted its hive. As no eggs had been laid by the young queen, a comb with eggs and larvæ was given to them when the bees were returned. The next day they issued three times, and the day after once, early in the morning. Then their queen was given to a nucleus rearing queens, and her place supplied with a sealed queen cell. The queen remained contented in her new home, and as she began to lay eggs the next day, she must have been impregnated* before her last swarming. The early hour in the morning at which the bees left for the fifth time, precluded the idea that the bees left—as they sometimes do—to accompany the queen on her wedding tour. The nucleus from which this queen was taken, swarmed again the same day, uniting with another nucleus which had deserted its hive.

These facts show that, in this instance, the workers were the active agents in the determination to seek a new home.

L. L. Langstroth.

*I have usually found eggs in the comb, in about 48 hours after the impregnation of a queen. In one instance, this summer, the queen did not begin to lay until four days, and in another instance not until five days after I found them on the comb with evidences of impregnation.

☞Huber concluded, from his own observations, that the queen incites the bees to swarm, by her uneasiness and alarm, and by an incessant coursing to and fro on the combs, thereby producing commotion among the workers, terminating in a sudden rush to the entrance and a precipitate departure of the swarm. To test this, Gundelach confined the queen of a strong stock at the swarming season. Still, a swarm left in due time, though it speedily returned and re-entered the hive. Dr. Dönhoff also made repeated experiments with small nuclei, each consisting of a queen and a few hundred workers—the queen being confined in a cage. His primary object, however, was to test the effect of introducing a very fœtid oil in the combs; having on a previous occasion noticed that when such oil was applied to a comb, the bees immediately deserted it. He intended making the experiment at noon, on a fine day; but at 11 o'clock the bees of one of his nuclei swarmed out. Not a bee remained, and the queen moved about very unconcernedly in her cage. The bees soon returned, and in fifteen minutes were as quiet and seemingly as contented as if they had never left. At half past eleven, he poured some fœtid oil on the combs of another nucleus. The bees instantly retreated and gathered in small clusters in various parts of the hive. At 2 o'clock in the afternoon, the whole body issued and clustered, in detached parties, on a neighboring tree. The queen seemed content and unaffected in her cage. In a short time the bees returned, and many of them repeatedly entered the hive, but were evidently repelled by the odor of the fœtid oil, and finally they dispersed, forsaking the queen and joining other colonies.

Whence did the swarming impulse emanate in these instances? Certainly not from the queens, thus circumscribed in their movements and wholly unagitated and passive. Manifestly it could have proceeded from the workers alone.

Dzierzon is of opinion that the swarming impulse is not communicated by the alleged restless and uneasy movements of the queen, as Huber supposed; because an old and decrepid queen, unable to fly and scarcely able to crawl about on the combs, such as sometimes accompanies a first swarm, is not likely to possess sufficient physical strength or vigor to make the requisite exertions, if such were necessary. How, moreover, he asks, could a queen know the state of the weather, so as to be sure that the propitious moment for swarming had just then arrived? As the mature virgin queen is prompted to make her wedding trip by the joyful hum and turmoil of the disporting bees, instead of furnishing the incentive for such disporting, so the queen is led to join the issuing swarm by the bustle and commotion of the workers. He adds, "I once caught and removed a *teeting* queen at 7 o'clock in the morning, and at noon an after-swarm issued, though there was then certainly no mature queen in the hive, as was evident from the speedy return of the swarm. Here the bees had certainly issued without any prompting from a queen, but in the confident expectation that the one I had taken away would accompany them—her removal having doubtless not been discovered by them prior to the swarming."

Notwithstanding all this, Dzierzon suspects that the primary impulse to swarming proceeds from the queen, though not from the uneasiness and restlessness which she manifests, but from the tones of anxiety and apprehension which she from time to time emits. These apprize the bees of the impending necessity for an early emigration, and that delay might endanger the queen. Confinement of a queen has no bearing on the case; for as a queen incapable of flying will still issue with a swarm, unconscious of her disability, tho' she fall to the ground a dozen times, so a

confined queen is not conscious that she cannot leave the hive, though fully conscious of impending danger, and may, in consequence of her uncomfortable situation, all the more urgently endeavor, by *teeting*, to induce the bees to swarm.

When all things are ready, and the resolution to emigrate has been formed by both workers and queen, the immediate incitement to leave may still proceed from causes wholly irrespective of either party. It may be produced by a swarm then issuing from some neighboring colony. This is quite natural, and it is by no means unusual, in the swarming season, for several swarms to issue simultaneously from different colonies when one has left. They are tempted forth by the peculiarly attractive tones emitted by the first: which likewise not unfrequently induce a swarm already hived to take wing again. Such are Dzierzon's views.

PLEASE GIVE CREDIT.

We find a large number of our original articles copied into other Journals without proper credit. We presume it is scarcely necessary for us to say that this is a direct violation of editorial courtesy. We are scrupulously careful to credit all the articles not prepared expressly for the Bee Journal; and therefore feel that we have a right to ask a similar recognition of *our* rights at the hands of our editorial brethren. Will those who have been appropriating our articles, please take the hint?

☞The year 1860 must be regarded, taking "the world round," as the poorest honey year of the present century. California and Australia excepted, failures and losses are complained of everywhere. In Poland, Hungary, and Germany, it is designated as the unpropitious, and in France the calamitous year. In England a large number of colonies in common hives were lost, and in some districts entire apiaries destroyed. The result is generally attributed more to the insufficiency of the supplies which the bees were able to collect during the previous summer and fall, than to the severity of the last winter.

NOVEL EXPERIENCE.

A young man named Hunter, living some six miles east of Polk City, on the prairie, where trees and fences were wanting, was the other day placed in a rather trying position. A large swarm of bees seeking a resting place, settled upon his person, completely covering his legs and body. In this condition he walked to the house, some 100 rods distant, where, obtaining a box, the bees were successfully hived, without injuring him.—

Des Moines Journal.

[For the "Bee Journal."]

THE QUEEN'S FERTILITY.

I think the Baron of Berlepsch, in stating the number of eggs which a queen-bee may lay in a day, names a lower figure than the data, in the case of which he speaks, justify. He says, his double stock was introduced on the 10th of June, and the counting took place on the 28th, when 38,619 cells were found occupied by eggs and larvæ. This number he divides by 21 days, being "the average time required for the maturing of a worker." But as the eggs had been laid within 18 days, and the queen moreover had only inadequate accommodations on the first day, and the counting took place before the close of the last, it seems but fair to deduct one day from the term, and 17 days assumed as the full period of oviposition. This gives 2271 eggs as the average number laid per day, instead of 1839, or nearly twenty-five per cent. more. I do not doubt in the least that, had the colony been introduced in a hive completely furnished with empty combs, the number of eggs laid per day by the queen, would have fully equalled Dzierzon's estimate.

T. C.

[For the Bee Journal.]

THE AMERICAN BEE JOURNAL.

Everybody is speaking in the highest terms in regard to the intrinsic value of the American Bee Journal. It is admitted to be the periodical that has so long been needed by the Apiarians of this country. Editors of the Agricultural papers are beginning also to appreciate its worth. They can now make good and judicious selections respecting the management of bees, thus benefiting their apicultural readers more than they possibly could by the publication of the *milk-and-water* articles with which they are frequently favored. The American Bee Journal merits, and, therefore, justly deserves a permanent existence. I trust that the Agricultural Editors, as well as the editors of other periodicals, will continue to manifest a willingness to lend a helping hand in sustaining the only *American* Bee Journal, and thereby advance the bee interests of this country.

M. M. BALDRIDGE.

Middleport, Niagara Co., N. Y., 1861.

☞He who wishes to improve the bee pasturage of his neighborhood, should not neglect to plant maple, locust, chestnut and linden trees on his own premises, and encourage others to follow his example. The tulip, poplar, sugar maple and horse chestnut make much finer shade trees for towns and villages, than the nauseous Ailanthus.

[For the Bee Journal.]

Queens' Excursions.

A great diversity of opinion exists as to the time when the first excursion of a young queen in quest of drones for impregnation may be looked for. The June number of the Journal (page 130,) states the time at from the fifth to the twelfth day after issuing from the cell. I think this is a mistake; at least it has not been true with me.

I have practised *artificial swarming* exclusively, and make a record of the facts. The queen may be *confidently* looked for issuing from the hive, between noon and half-past two o'clock, P. M., or the second fair day after emerging from the cell —frequently on the first, and if drones are abundant, she usually meets them after one or two flights.

A practised eye will readily recognize the marks of impregnation with which she returns when successful; and in from two to ten days thereafter she will generally be found depositing eggs in the cells. One queen which issued from the cell on the 4th of July, took wing on the 5th, and had deposited quite a quantity of eggs on the 7th. Out of six which issued on the 26th ult., three became fertile on the 29th, two on the 30th, and one on the 1st inst. These are instances of the *earliest* fertility, however, I have ever known. It is accomplished in the following way, viz: *by permitting only one queen cell to remain in the hive.* In rearing queens, I always use *small clusters* only. If more than one queen be allowed to mature, and the swarm be large, the bees are apt to *cluster around and imprison the queens:* besides this, the queen will destroy all surplus cells before leaving; which, it is imagined, delays her impregnation. I have known the bees thus imprison a queen for *ten days!* By allowing *only one* royal cell to remain in the hive after the tenth day, no such result will ensue. The only difficulty in thus rearing queens by small clusters, in warm weather, is the greater liability of the bees to take flight with the queen when she seeks the drones, and then leave for the woods. This source of vexation and anxiety, is avoided by taking the precaution of having some larvæ or capped brood in the cells at this time. The bees will not then desert their nurselings, and the queen will return —except an occasional one. A few will be lost by accidents, such as being destroyed by birds, &c., to which risk *all* queens are *once* exposed.

MARTIN METCALF.

Grand Rapids, Michigan, August 4, 1861.

☞There is greater diversity in this important matter than is commonly supposed; and observers may differ widely in their statements and inferences, while each narrates the facts correctly. Circumstances exert a controlling influence and materially affect the result. Thus, queens reared in small nuclei, such as our correspondent uses, will certainly issue earlier and usually become fertile sooner, than such as are reared in larger colonies: and the seasonable removal of all surplus royal cells, will efficiently contribute to bring about the desired consummation. On the other hand, the young queen of a populous colony, whose hive was *full of comb*, well supplied with brood and honey, has been known not to be impregnated, though drones abounded, till more than three weeks after she left her cell. The truth seems to be, that there is no definite term—circumstances governing in every case.

[For the American Bee Journal.]

I would like to inquire through the Bee Journal, if it is a sure evidence that an Italian queen is not pure blood, when some of her young queens are dark-colored? I have one that I supposed to be pure, but occasionally a dark queen hatches from her eggs. As I have made an inquiry in relation to queens, I would like to say a few words about bee hives. Not wishing to say anything against any one's hive, nor to injure any one's feelings, I have used Rev. L. L. Langstroth's bee hive three seasons, and am fully convinced that it is the best hive in use; and I can highly recommend it to others.

Those who use it, need not feel afraid of being held liable to other parties for infringements, as Rev. L. L. Langstroth is the original inventor of the movable frame. C. B. BIGLOW.

Perkinsville, August 13, 1861.

☞In the Model Apiary belonging to an Apiarian Society at Nurstadt, in Germany, under the superintendence of Mr. Langbein, twenty-six colonies in Dzierzon hives and managed on the Dzierzon system, produced 1300 lbs. of surplus honey in 1857. Three colonies belonging to Mr. Hoffmann, produced 180 lbs; and fourteen colonies belonging to one of his neighbors, produced more than 500 lbs.

☞We have received a communication from a correspondent at Granville, Ohio, respecting the [supposed] difference of structure in brood and store comb. His observations, though original with him, are not new, and the seeming fact is susceptible of easy explanation. But his letter was received too late to permit further notice now.

The Italian Bee.

Mr. F. A. Deus, of Dusseldorf, who was a member of the German Apiarian Convention, at Mayence, in 1855, made a tour through a part of France, Switzerland and Italy, immediately after the Convention adjourned. He was accompanied by three other members of that body, and communicated to the Bienenzeitung, the following account of their search for and observations on the Italian bee.

"No trace of Italian bees could be discovered by us, on our route from Lake Biel onward through the valley of Chamouni, though common bees are kept in this valley during the summer, even as high up as within a mile of the Mer-de-Glace, where they produce a beautifully clear and highly aromatic honey from the nectar of the fragrant Alpine flowers. The custom of apiarians there, is to kill all their bees in the fall, as the winters are too severe and protracted to permit them to be kept over with advantage. Fresh supplies of swarms and stocks are procured every spring, from the warmer valleys in the vicinity of Geneva.

On entering Italy, we found neither bees nor beekeepers in the districts of Chamberry and Turin, nor along the route of the railroad thence to Genoa. But at the Villa di Negro, near the latter city, the genuine Italian bee exists in all its beauty and perfection. It was delightful to observe the celerity, agility and grace displayed in all their motions by the busy workers, as they rifled the flowers of their sweets. Their bodies were so slender and delicate, their colors so bright, and their markings so clear and distinct, as to surpass greatly any specimens of the race which had previously come under our notice. We caught a number of them, and preserved them in alcohol for future comparison. We did not succeed in finding any apiaries—the gardens of Genoa being chiefly surrounded by walls so high as to prevent intrusion.

We hoped to discover Italian bees while travelling with a vetturino to Nizza, along the shores of the Mediterranean; but were again disappointed. Not an apiary was seen in a three days' journey through a delightful country, crowded with small towns and villages. On our arrival at Nizza, we were mortified to find only the common bee prevalent there. It is hence evident that the Italian bee is not a mere climatic variety, but really a distinct race. We were repeatedly assured also that the common kind only was found in the Kingdom of Naples and in the warmer districts of Upper Italy. We chanced to fall in with a beekeeper from Normandy, who informed us that two kinds of bees were cultivated in that country—the common kind and also a yellowish or orange variety. The latter, he stated, were much preferred, as being more gentle and more industrious. The common kind, he said, were particularly irascible and wild. This account likewise corroborates the opinion that the Italian bee is not the common insect modified by special climatic influences, because Normandy differs little in that respect from Central Germany.

At Lago Maggiore and Lago di Como, we found Italian bees exclusively, and of the most perfect type, like those of Genoa. These districts, indeed, appear to be their chief *habitat*."

VITALITY OF SPERMATAZOA.

At a meeting of the Austrian General Agricultural Society, Mr. Hoffmann, of Vienna, reported to the Section on Bee-culture, the results of some further experiments made by him with spermatazoa, taken from the spermatheca of a queen bee. These show that the vitality of the spermatazoa is exceedingly tenacious. He kept some immersed in cold water 71 hours, and found that they were still alive and active on being placed in a moderately warm temperature. Even spermatazoa taken from a recently-killed queen, moved freely after immersion in cold water for ten hours. Nay, spermatazoa exposed on the glass plate of a microscope and allowed to become dried, exhibited motion again on being wetted and placed in a warm temperature.

FEEDING BEES ON SUGAR-CANDY.

This is a discovery of the utmost importance. It has been ascertained by actual experiment that a few pounds of sugar-candy will (particularly in the Langstroth hive) preserve a colony from starvation. The candy may be purchased at a confectionery: the plain is preferable, but hoarhound or lemon will do: it is made in slats about an inch wide and a quarter of an inch thick, and laid on top of the frames, just below the honey board: a few sticks may be stuck amongst the bees. It, or loaf-sugar, may be pulverized and rubbed in the combs. From two to four pounds, according to the condition of the hive, will effectually prevent a colony from the perils of starvation. Full directions how to prepare the candy, will be found in Mr. Langstroth's work.

☞Bees which are really dead, will always be found to have the proboscis protruding. When this is not the case with bees apparently dead, they may be revived by sprinkling them with diluted honey or sugar-water, and placing them in a warm room.

[From the "Bienenzeitung."]

Can Bees Hear?

Whether bees can hear or not, is still an open question. Dr. Dönhoff says—"that bees can hear, may fairly be inferred from the teeting and quahking of young queens. Whoever has listened for fifteen minutes to the calls aud responses, cannot fail to regard them as proof positive that bees can hear." I freely admit that this, if anything, might warrant such inference; but still cannot concede that it furnishes "proof positive" of the fact.

Bees undoubtedly possess means of communicating with each other. Because their utterances are audible to us, and seem, in many instances, susceptible of intelligent interpretation, we are ready to regard and speak of them as their *language*. But it does not follow, that the bees themselves apprehend these utterances "by the hearing of the ear." There are various other nervous media of communication by which their sensorium may be reached and affected. All the sounds emitted by them, teeting and quahking included, are accompanied by motions of the wings, and produce concussions or vibrations of the air, which obviously influence the acute nervous sensibility of these insects. And it seems singular that they are affected by these utterances, with few exceptions, only within their hive. External and foreign sounds appear to make not the slightest impression on them. The clangor of trumpets, the report of fire-arms and the deafening crash of thunder, do not affect them in the least perceptible degree, either within or out of the hive. Yet the slightest touch of the bottom board, or the gentlest tap on the hive, is instantly responded to by a brusque buzz throughout the entire colony. The question whether they can hear is, consequently, interesting not alone to the beekeeper, but to the physiologist also, and well deserving of scientific investigation. The antennæ have been regarded by some, as organs of hearing; and as articulated members, extending freely in the ambient air, they would seem to be peculiarly adapted to take cognizance of the faintest pulsations of the air, and receive impressions from every wave of sound. But the question still recurs, does the sound act simply on the sense of *feeling*, or do the antennæ include special auricular nerves? KLEINE.

A German treatise on bees, published in 1692, says—bees are fond of music; when one flies about your head threateningly, *whistle a merry tune*, and it will immediately become pacified!!!

[For the Bee Journal.]

Development of Queen Bees.

MESSRS. EDITORS:—In the June number of the American Bee Journal, Mr. Langstroth stated a case of "slow development" of a queen bee. Several similar cases have come under my notice. In the last case which attracted my attention, several queen cells had been *sealed* over before the construction of the last queen cell *was commenced.* I did not note the precise time which elapsed from the laying of the egg to the maturity of the last queen, but it must have been about three weeks. In all such cases which I have noticed, the eggs from which the last queens were reared, were allowed to remain unhatched for several days after the others had been hatched.

On the 24th of June last, I removed an Italian queen from her hive. Some ten or twelve queen cells were built. On the 3d of July (*just ten days after the removal of the old queen*), on examining, I found two or three young queens had already emerged from their cells, and the workers were busily engaged in tearing open most of the remaining royal cells.

Again, on the 29th of June, I removed the queen from another hive. On the 9th of July, I found two newly-fledged queens alive (some three or four others had been hatched), and the remaining seven or eight cells were in process of demolition by the workers.

In both these last cases, either the eggs from which the developed queens were reared, must have been laid *six days* prior to the removal of the queen, or the bees must have developed them in less than their usual period of sixteen days. Doubtless the former was the real state of the case.

Baltimore. R. C.

☞We have received a copy of "*The Beekeepers Directory,*" by J. S. Harbison, of Sacramento, California. It is a volume of 440 pages, with 81 illustrations, generally well executed. We have had leisure only to give it a cursory perusal. The practical portions of the work, especially those based on the personal experience of the author, are very good, and are a valuable addition to our English bee literature. From much of the theorizing, however, we are constrained to dissent.

If bees intentionally discard their old queen in the spring, they generally build three or four royal cells, in their anxiety to rear a successor, and diminutive swarms may then issue at an unusually early period.

AMERICAN BEE JOURNAL.

Philadelphia, September, 1861.

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NEW FOREIGN PUBLICATIONS.

Ten years ago, the press of Germany used to teem with catchpenny bee-books, from the pens of the Breyers, Von Reiders, and other professional compilers, who suited their productions to the market for which they were intended—the gullible portion of the public. But all that has been changed there, by the general diffusion of information in the community, of which work, the "Bienenzeitung" has been the principal and most efficient medium. The works which now appear are of a higher order. Though few in number, by their intrinsic merit they effectually suppress the multitudinous small fry which formerly filled the land.

Three highly valuable and comprehensive works have made their appearance in Germany within the last twelve months. The first of these is a treatise on "*Bee culture in poor honey districts,*" by the Baron of Berlepsch. It is a royal octavo volume of 475 pages, with numerous wood cuts; and though from its title, its design would seem limited to a special purpose, it embraces the whole subject of bee management, and discusses very thoroughly whatever in the natural history and physiology of the bee has a bearing on practice. A chapter on "*the sexuality of bees*" was written expressly for this work by Professor Leuckart, of Giessen, of which we purpose furnishing a translation for an early number of the Bee Journal.

The second work is a revised, systematized and condensed republication of the Bienenzeitung, giving, in a connected form, all the valuable material contained in the sixteen volumes of that valuable periodical. Dzierzon's communications, for substance, yet in his words, constitute the text; and the contributions of other correspondents, discussing various topics, and also those sustaining or impugning Dzierzon's peculiar tenets or teachings, are appended as foot notes, in small type and double columns. The first volume, a copy of which has reached us, is beautifully printed, contains 611 large octavo pages and 42 illustrations on seven lithographic plates, and is embellished with a faithful likeness of Dzierzon. This volume is devoted to the *theory* of bee culture, as illustrated in the pages of the Bienenzeitung. The second, which we expect to receive shortly, will embrace the *practice*, as described and explained in the same Journal. The two will constitute an invaluable treasury of apiculture and apicultural science, such as the Germans may well be proud of, and which cannot but give a renewed impulse to bee culture among them, now that the earlier volumes of the Bienenzeitung are out of print and can rarely be procured.

The third work is Dzierzon's most recent production, entitled "*Rational Bee Culture.*" This is an entirely new treatise, prepared specially for the use of practical apiarians, who desire to prosecute bee culture systematically. In it, theory is adverted to only incidentally, and in so far as is essential to a clear understanding of the practical processes. The volume contains 309 pages, with 50 illustrations, and is spoken of as being unquestionably the best popular treatise on the subject now extant in the German language. It has not yet been received in this country, but a copy will reach us early in autumn.

Monthly Management.

SEPTEMBER.

In some sections of country, where fall-blossoms abound, bees will find pasturage during a considerable portion of this month; and though much of the honey they now gather is less palatable than that collected at an earlier period, it will answer well for their own subsistence in the coming winter. But their accumulations derived from honey-dews on evergreens generally prove injurious to the stock. This honey is of a very inferior quality, and cannot be properly purified by the bees, because of the lateness of the season at which it is gathered; and as it, for the most part remains unsealed in the cells, it is apt to become acid and produce disease, if the bees happen to be long confined by the severity of the winter, or the inclemency of the weather. Besides this, when tempted to fly, by the occurrence of such honey-dews at so late a period, many bees will be lost by becoming entangled in the webs of spiders, or be destroyed by hornets, which now eagerly watch for, catch, and devour them.

Towards the close of the month the colonies usually contain very little brood; and, if kept in common hives, the bees of such as are not intended to be wintered as independent stocks, may now be driven out and given to the best provisioned standards. The stores and combs may either be appropriated at once, or reserved in the hive for spring use, to receive the earliest swarms. Where movable comb hives are used, it is unnecessary to defer these operations to so late a period, as the combs still containing brood may at any time be transferred to the hives intended to be wintered, and colonies can be united without producing much commotion among the bees. Such colonies only as are in a healthy condition, have a young and fertile queen, and ample stores of honey and pollen, should be wintered. The attempt to carry feeble stocks through the winter will almost invariably end in disappointment, besides being attended with continual vexation of spirit. The making of artificial colonies, properly employed, is of incalculable importance in bee culture, mainly because we can thereby always secure a supply of young and vigorous queens, but it becomes ruinous to an apiary, when the beekeeper multiplies stock injudiciously and inordinately, and then undertakes to winter his feeble and ill-provisioned colonies. None should be reserved for wintering, but such as have at least twelve pounds (nett) of sealed honey on the first of October, and have sound clean combs, a healthy vigorous queen, and bees enough to cover five or six combs when clustered on them in the evening. All that fall below this standard should be broken up, adding the bees to other stocks, and using the stores for further provisioning the weaker of those retained. The poorer the season was, the more care should be taken to unite and strengthen colonies in the fall. All the good, new and clear combs obtained by these operations, should be carefully preserved for spring use—they will "come into play" when hiving early swarms, or making artificial colonies. These, if supplied duly with good empty comb, will in three or four weeks, be quite as valuable as an old stock whose feebleness exacted much attention and constant care during the winter. He who is in the habit of wintering weak colonies, must never expect to become a prosperous beekeeper. He will have trouble during the winter, and with all his watchfulness will lose some stocks; those which survive will make slow progress in the spring, be laggards during the summer, and instead of yielding him some surplus honey in the fall, will probably need renewed nursing.

Even if after a favorable season, it be found that all the colonies in an apiary have secured sufficient supplies, it will still not be advisable to winter them all. Among them there will probably be some whose queens are old and decrepid. Should these chance to survive till spring, the number of eggs laid by them would be too small to replenish the population of their respective hives, adequately and early. Such had better be disposed of in the fall. If the hives contain good combs and a sufficiency of stores, the superannuated queens should be removed and replaced by a young one, from a colony not so well prepared, in other respects, to pass the winter safely. Italian queens may at this time be more conveniently introduced into common colonies, than at almost any other period. There being now but little brood in the combs, the workers are less disposed to build royal cells after the removal of the old queen; and the Italian queen may, without disadvantage, be kept confined in a cage for a week or longer, till the bees have become entirely willing to accept her. Queens may likewise be used, whose genuineness has been previously ascertained or fully tested.

Those who still practise the old mode of taking surplus stores from the colonies, by cutting out a portion of the combs containing sealed honey, must deal liberally with their bees—allowing them to retain a full sufficiency for their support, so situated as to protect them from the severity of the weather, and being likewise conveniently accessible, from time to time, as needed. It is better that the bees should have more than enough, than to rely on spring feeding, should their supplies fall short.

Colonies which still retain their drones at the close of this month, are usually queenless. The population of such is almost invariably much reduced and composed of old bees exclusively, which are not well qualified to endure the rigors of winter. The proper course is to break them up, and appropriate the honey. The combs of such stocks generally contain large quantities of pollen, and should therefore be preserved till the close of winter. Then they may profitably be given to young stocks of the previous year, which are rarely well supplied with that article.

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(From the "London Quarterly.")

The Honey Bee.

(FOURTH AND FINAL MODICUM.)

That the mother of so large a family, and queen of so rich a store, passes her honeymoon somewhere may be reasonably supposed; but such is her innate modesty, that the time and scene of her matrimonial trip was long involved in the utmost mystery. It was uncertain whether she loves the pale moonlight, or whether, as Huber was inclined to suppose, she prefers a bright May morning; though it is now known that she selects the hour of "high noon," and, Hero-like, lights her torch of love on high, though she scrupulously shuns the curious eye of man, and for ages baffled his endeavors to pry into those mysteries which she so sedulously conceals.

If it should be thought surprising that men who devoted their life-time to studying the habits of bees, failed to come to any satisfactory conclusion on this subject, till recently involved in mystery, it will be far more a matter of wonder, to learn what they have been unable to discover. We allude particularly to the power possessed by the workers, when they have lost their natural monarch, of converting the grub of one of the common bees into a royal and consequently prolific personage. Such an extraordinary assertion, first published by Schirach, though probably known in earlier times, may be supposed to have met with no ordinary opposition, but it has been confirmed by repeated observations and experiments, and is as well attested—thanks to Huber especially—as any such facts can ever be. Being so established we may assert it to be (without any reservation whatever,) by far the most extraordinary fact ever brought to light in natural history. Fully to comprehend it, we must refer our readers to the great differences we stated in a former part of these papers to exist between the workers and the queen, or rather to the more minute anatomical distinctions given by entomological writers, and then they are called upon to believe that, by enlarging three common cells into one, and feeding the worm not more than three or four days old, with a peculiar food, richer than the common bee-bread—called, from its queen-making qualities, "royal jelly,"—not only is its body lengthened, its wings shortened—its wax-pockets, and its bread-baskets, and the down on its legs obliterated—its sting and proboscis altered in shape—its fertility developed—but all its instincts and habits so completely changed, that no difference whatever is observable, when it emerges from the cell, between it and the rightful queen, either in the character and duties it assumes or in the reverence paid to it by the masses.

We wish much that we had space to describe at length the jealousy and combats of rival queens, the senses of bees, and their architecture, as well as the general economy of the hive. But half the interest of these things depends on that freshness and minuteness of detail which is best given in the words of the original eye-witnesses. It is only by a figure that we can include, in this class, him who has been deservedly placed at the head of all writers upon bees—the intelligent and enthusiastic FRANCIS HUBER. No one who ever hopes to be master of a bee-house, should be ignorant of his services, or of the difficulties under which he performed them. His name has been so long before the public, that many will learn with surprise that he died, at the age of eighty-one, so late as December, 1831. An appropriate tribute has been paid to his memory by his brother naturalist—De Candolle.

Francis Huber was a precocious and enthusiastic child, and the pride of his father, who imparted to him that love of science, which, while it produced the misfortune, proved also the comfort of his life. One of his relations had ruined himself in his search after the philosopher's stone; and he himself impaired God's greatest blessing of sight at the early age of fifteen, by the ardor with which he devoted himself to philosophical studies. His father sent him to Paris to be under the care of the most experienced physicians; but, though his general health, which had also given way, was restored by the sensible prescription of rural life and diet, the cataract baffled the skill of the oculist Venzel, and he was sent home with no better promise than that of confirmed and increasing blindness. "His eyes, however," says his biographer De Candolle, "notwithstanding their weakness, had, before his departure and after his return, met those of Maria Aimee Lullin, a daughter of one of the Syndics of the Swiss Republic. They had been companions at the lessons of the dancing-master, and such a mutual love was cherished as the age of seventeen is apt to produce." It was far too deep and too true an affection to run smooth. The father of the girl naturally regarded the growing blindness of the youth as destructive of all advancement in life, and positively forbade his suit. Meanwhile poor Huber dissembled his increasing infirmity as well as he could, and, with a pardonable fraud, spoke as though he could really see. There was at least language enough in his eyes for Maria Lullin, and she, resolute as her father, would allow no subsequent misfortune to quench the light of other and happier days. At twenty-five and not till then, did the law allow her to decide for herself, and seven long years was a dangerous trial for any girl's fortitude, beset with the remonstrances of her friends, and the daily vanishing hopes of restoration of sight to her lover. But she was nobly faithful. She was proof against all persecutions and persuasions; and when seven weary years were gone, she gave her hand where her heart had been given long before—to him, who, though her husband, could scarcely act the part of her protector. The youthful partners at the dancing-academy, naturally ripened into partners for life, and she became not only Huber's wife, but his assistant in his researches—she was "eyes to the blind," his reader, his secretary, his observer.

No higher praise can be given to Huber than to say he was worthy of her. He was the most affectionate and devoted of husbands.

"Her voice was all the blind man knew,
But that was all in all to him."

"As long as she lived," he used to say in his old age, "I was not sensible of the misfortune of being blind." And alluding to her small stature, he would apply to her the character of his favorite bees,

"Ingentes animos angusto in pectore vertant."

Huber was not only fortunate in his wife, but also in his servants and children. Burnens, who, under his direction and tuition, made the greater part of his observations on bees for him, has this tribute paid to him by his master and friend.

"It is impossible to form a just idea of the patience and skill with which Bernens carried out the experiments which I am about to describe. He often watched some of the working-bees of our hives, which we had reason to think fertile, for the space of four-and-twenty hours, without taking rest or food, in order to surprise them at the moment when they laid their eggs. I frequently reproached myself for putting his courage and patience to such a trial; but he interested himself quite as much as I did in the success of our experiments, and counted fatigue and pain as nothing in comparison with the great desire he felt to know the results. If then there be any merit in the discoveries, I must share the honor with him; and I have great satisfaction in rendering him this act of public justice."

As to Huber himself, we took up his book with the not unreasonable prejudice of not liking to be led by a "blind guide," and with the common notion that all his discoveries had been proved the mere work of an imagination naturally rendered more lively by being severed from the view of external objects. We confess ourselves to have been entirely misled. Like every enthusiast who ventures to brave the prejudices of self-satisfied mediocrity, by the bold statement of his discoveries, he met with a torrent of ridicule and abuse, which he hardly lived to see stemmed. Though fancy must ever throw some little of her coloring over a subject such as this, (for all imputations of human motives to such creatures must be merely fanciful,) yet Huber's facts are now admitted unchallenged. To him we are indebted for the knowledge that wax is produced from honey, of the impregnation of the queen-bee, of the existence of fertile workers, of artificial queens, of the use of the antennæ, of the senses and respiration of bees, and of endless discoveries in their general economy and management. Many, indeed most of these things, had been suggested before, but Huber by his earnest zeal and captivating style, achieved for bees what Scott has

done for his native lochs and mountains—he wrote them into notice and interest;—and he confirmed or refuted by actual experiment, the floating notions of his predecessors, so that, though not positively the first originator of the doctrines that are generally referred to him, and though succeeding ages will doubtless question and improve upon his theories, Huber's name will ever remain in bee-knowledge, what that of Bacon is in inductive philosophy, and Newton in science, and Watt in steam.

"The bee," says an old writer, "is but a year's bird with some advantage." Those 'hatched,' as Evelyn would say, in May, die before the following year. Dr. Bevan, indeed, gives only an average of six months to the worker, and four to the drone. We think he cuts the life of the worker too short, as no doubt some live till July of the following year. If his account were correct, the sacrifice of their lives by stifling would not be so great a loss as it would at first appear. But their use in the second year, is not so much for gathering honey, as for tending and nursing the young.* The queen-bee, though she does not "live forever," has certainly been known to last to a fourth and even a fifth summer. The duration of a bee-colony, is of course a very different thing to the life of an individual bee, though they seem, by the ancients especially, often to have been confounded. Columella assigns ten years as the utmost limit to a hive, and though instances are brought forward of a longer period, naturalists seem to be agreed that this would be the ordinary termination of a hive left to itself.

Whatever may be the period which nature or man allots to the life of the queen or the worker, there is one sad inhabitant of the hive who is seldom allowed, even by his own species, to bring his dreary autumn to a natural close. About the middle of August, the "awful massacre of the innocents," the killing of the drones, begins. "After which time," as Butler has it, "these amazonian dames begin to wax weary of their mates, and to like their room better than their company. When there is no use of them, there will be no room for them. For albeit, generally among all creatures, the males as the most worthy do master the females, yet in *these* the females have the pre-eminence, and by the grammarian's leave, the feminine gender is more worthy than the masculine." There is something unavoidably ludicrous in the distresses of these poor Jerry Sneaks.

* This is a mistake and the reverse of the truth. *Old* bees do not tend and nurse the brood. This is done almost exclusively by the young. Even in the spring the younger bees superintend the nursing of the early brood.—Ed.

Having lived in a land of milk and honey all summer long, partaken of the best of everything, without even stirring a foot towards it, coddled and coaxed, and so completely "spoilt" that they are fit for nothing, who can see them "taken by the hind legs and thrown down stairs," with a heap of workers on top of them—their vain struggles to return—their adroit attempts to steal in slily—their disconsolate resignation at last—without thinking it a just retribution for the past months of a pampered and unprofitable life? And yet there is mingled with this feeling a degree of pity for these "melancholy Jacqueses" thrown aside (we mix our characters as in a masquerade) by the imperious and unrelenting Catharine of the hive. "At first, not quite forgetting their old familiarity, they gently give them Tom Drum's entertainment: they that will not take that for a warning, but presume to force in again among them, are more shrewedly handled. You may sometimes see a handful or two before a hive which had been killed within; but the greatest part fly away and die abroad." We need not name the author we are quoting, who, fearful that womankind would take this Danaid character for their example, proceeds: "But let not nimble-tongued sophisters gather a false conclusion from these true premises, that they, by the example of these, may arrogate to themselves the like superiority: for *ex particulari non est syllogizare;* and He that made these to command their males, commanded them to be commanded. But if they would fain have it so, let them first imitate their singular virtues, their continual industry in gathering, their diligent watchfulness in keeping, their temperance, chastity, cleanliness, and discreet economy, &c.," and so he sums up all womanly virtues from this little type, as if he believed in the transmigration of souls described by Simonides—not him of Cos—in his Iambics. We give the translation as we find it No. 209 of the "Spectator."

"The tenth and last species of woman were made out of a bee; and happy is the man who gets such an one for his wife. She is altogether faultless and unblameable. Her family flourishes and improves by her good management. She loves her husband and is beloved by him. She brings him a race of beautiful and virtuous children. She distinguishes herself among her sex. She is surrounded with graces. She never sits among the loose tribe of women, or passes away her time with them in wanton discourses. She is full of virtue and prudence, and is the best wife that Jupiter can bestow on man." What can be the better than wish that every good bee-master may meet with a bee-wife.

We very much question the utility of the common "moralities" drawn from the industry and prudence of the bee. Storing and hoarding are rather the curse than the requirement of our ordinary nature, and few, except the very young and very poor, require to have this sermon impressed upon them. We are rather inclined to believe that, had Almighty Wisdom intended *this* to be the lesson drawn from the consideration of the works of his creatures, we should have been referred, in his revealed word, to the housewifery of this insect "fowl of the air," rather than to the ravens, "which have neither store-house nor barn." Yet the thrifty bee is never once set before us as a pattern in the Bible. The wise King indeed, "who spake of beasts, and of fowls, and of creeping things, and of fishes," has referred the sluggard and the distrustful to the early hours and the "working while it is yet day," and the guileless security of the ant; but we see nothing in his words which necessarily implies approbation of that anxious carefulness for the morrow, which we are elsewhere expressly told to shun, and which is but too often the mask of real covetousness of heart. And we believe this the more because the ant, though it wisely provides for its daily bread, *does not* lay up the winter store wherewith to fare sumptuously every day.

We know that in saying this, we are flying into the uplifted eyes of careful mothers, and bachelor uncles, who time out of mind have quoted, as it had been quoted to them, the busy bee as the sure exemplar of worldly prudence and prosperity. But we think that we can show them a more excellent way even for earthly honor, if they, as Christ's servants, will content themselves with those types in the natural world, which He himself has given them, and learn that quiet serenity and trustful contentedness, and ready obedience, and active labor for the present hour, which He has severally pointed out to us in the lilies, the ravens, the sheep, and the emmets, rather than seek elsewhere for an emblem of that over-curious forecasting for the future, which, whether in things spiritual or temporal, is plainly discouraged in the Word of God—those laws and judgments of the Lord, which are *sweeter than the honey and the honey-comb*, and in the keeping of which "there is great reward."

> "Take that, and He that doth the ravens feed,
> Yea, providently caters for the sparrow,
> Be comfort to thy age."

Not but that the bee affords us a moral, though it be not that which worldly wisdom commonly assigns to it. We have in the first place, a direct cause for thankfulness in the delicate food with which it supplies us. "The bee is little among such as fly, but her fruit is the chief of sweet things," (Eccles., xi., 3,) and the Almighty has in many senses, and in no common cases, supplied the houseless and the wanderer with "wild honey," and "a piece of honey comb," and "honey out of the stony rock;" and "a land flowing with milk and honey," has been, from the first the type of another and a better country. And the little honey-maker is itself indeed one of the most wonderful proofs of the goodness and power of God. That within so small a body should be contained apparatus for converting the "virtuous sweets" which it collects, into one kind of nourishment for itself—another for the common brood, a third for the royal—glue for its carpentry—wax for its cells—poison for its enemies—honey for its master—with a proboscis almost as long as the body itself, microscopic in its several parts, telescopic in its mode of action—with a sting so infinitely sharp, that were it magnified by the same glass which makes a needle's point seem a quarter of an inch, it would yet itself be invisible; and this too a hollow tube;—that all these varied operations and contrivances should been closed within half an inch of length and two grains of matter, while in the same "small room," the "large heart," of at least thirty * distinct instincts is contained—is surely enough to crush all thoughts of atheism and materialism, without calling in the aid of twelve heavy volumes of Bridgewater Treatises.

But we must hasten to end this too long paper. Its readers, generally, will be above that class to whom profit, immediate or remote, from bee-keeping, can be of any serious moment—though indeed profit lies in saving bees, not in killing them. But many prejudices have to be done away, and greater care bestowed, and better knowledge of their habits acquired, before the murdering system can be eradicated from the poor. It is for the better educated and more intelligent to set the example by the introduction and use of cheap and simple but better constructed hives—by personal interest taken in their bee-management—by recommending the best written books on the subject—above all by adopting the merciful system in their own gardens, and entrusting their hives to the special care of one, whose office it should be, not only to diligently tend and watch his master's stock, but also to instruct the neighboring cottagers and farmers in the most improved management. It would be an excellent plan to attach a stall of bees to the south wall of every

* Kirby and Spence. Introd. to Entomology, ii. 504.

farm-house with a glass side towards the interior, so that the operations of the bees might be watched from within. The custom of placing them within an arched recess in the wall of the house, was one of old Rome, and is still observed in some countries. We look upon this as a very pretty suggestion for a fancy cottage in any style of architecture. Perhaps the directors of normal schools could find no better way of teaching their pupil schoolmasters how to benefit and gain an influence among the parents of the children they will have to instruct, than to put them in the proper way of making and managing the lately introduced movable comb-hives, of taking honey, making artificial colonies, rearing queens, joining stocks, and hybernating the bees.

We said if any man would keep bees, he must make them his friends:—nay, that is a cold word—he must love them. De Gelieu makes the remark—which we have often heard before—of figs, and olives, and medlars, and truffles, or of an equivocal dish recommended by a host—that you must either like them very much or not at all. It was this love we suppose that led Mahomet to make an exception in their favor, when all other flies were condemned—that made Napoleon, who laughed at the English as a nation of shopkeepers, select this emblem of industry, in place of the idle lily,

"That tasks not one laborious hour."

And Urban VIII. and Louis XII. adopted them as the device on their coat of arms, and Camdeo, the Cupid of Buddhism, strung his bow with bees. The Athenians ranked the introduction of the Bee among their great national blessings, tracing it up to Cecrops, "the friend of man"—the Attic Alfred; and such regard is still paid to them in many parts of the south of England, that no death, or birth, or marriage takes place in the family, without its being communicated to the bees, whose hive is covered, in the first case, with a piece of black cloth, and in the two latter, with red. The 10th of August is considered their day of Jubilee, and those which are seen working on that day are called Quakers. Omens were wont to be taken from their swarming: and their settling on the mouths of Plato and Pindar, was taken as a sure presage of the sweetness of their future eloquence and poetry; though these legends are somewhat spoiled by the same event being related of the infancy of Lucan and St. Ambrose, called, as was Vives afterwards, the Mellifluous Doctor. We all know of Nestor's "honeyed words," and Xenophon, "cujus sermo est melle dulcior." Bees have not only dispersed a mob, but defeated an Amurath with his Janissaries;* but it would be quite impossible, in a sketch like this, to give anything like a full account of their many honors and achievements, and of the extraordinary instinct displayed by them in every operation of their manifold works. Our object in these remarks has been rather to stimulate the novice in this subject, than to give a complete history of their habits, or to put forth any new discovery or system of our own. We have introduced our little friends with our best grace, and must leave them now to make the best of their way with our readers.

"So work the Honey Bees;
Creatures that by a rule in nature, teach
The art of order to a peopled kingdom.
They have a king, and officers of sorts:
Where some, like magistrates, correct at home;
Others, like merchants, venture trade abroad;
Others, like soldiers, armed in their stings,
Make boot upon the summer's velvet buds:
Which pillage, they with merry march bring home
To the tent royal of their emperor:
Who, busied in his majesty, surveys
The singing masons building roofs of gold;
The civil citizens kneading up the honey;
The poor mechanic porters crowding in
Their heavy burdens at his narrow gate;
The sad-eyed justice, with his surly hum,
Delivering o'er to executors pale
The lazy, yawning drone." *Henry V., a. 1. s. 2.*

Who would not affirm from this and other incidental allusions, that Shakspeare had a hive of his own? Dr. Bowring has only been able to discover in them "galleries of art and schools of industry, and professors teaching eloquent lessons." Perhaps our friend means Mechanics' Institutes, and travelling lecturers.

*The Abbe della Rocca relates that "when Amurath, Turkish emperor, during a certain siege, had battered down part of the wall, and was about to take the town by assault, he found the breach defended by bees, many hives of which, the inhabitants had stationed on the ruins. The Janissaries, although the bravest soldiers in the Ottoman empire, durst not encounter this formidable line of defence, and refused to advance."

BEES IN MISSOURI.

Mr. Thomas Allen, of Crystal Springs, St. Louis, Mo., says that in that section of country, such is the mildness of the climate, that "bees are often tempted out of their hives in winter. Some years they begin to work in March, and I have taken full boxes of newly made honey as early as the fifth of May. The same hive will, in favorable seasons, bear robbing three times, and throw off perhaps three or four swarms of young bees."

☞*Please send us the names of beekeepers.*

Instinct and Reason.

Although many of the complicated actions of the Bee and other insects bear evidences of discrimination and emotion, and are of a decidedly higher character than those simple movements and operations performed by the creatures placed lower in the animal scale; and though it has hitherto been impossible to distinguish many of the former from truly rational acts, yet we do not consider the whole mental nature of these animated beings entitled to a higher designation than that of instinct. Notwithstanding that it foreshadows those psychical powers and faculties that become developed in the reasoning creatures, yet it wants at least one clearly defined quality which is now employed, as it appears to us, with great propriety, to stamp the nature of true reason; and that is *educability*.

Insects never improve in their mode of proceeding, nor excel one another in the ability with which they perform their labors. There never was a bee wiser than another bee; nor a generation of bees that effected improvements in the economy of the hive; and if we were able to suggest to the creatures an improved *modus operandi*, it is questionable whether any amount of teaching would have a perceptible effect upon them.

A careful consideration of the nature and phenomena of this *higher* phase of instinct, has suggested to us the designation of "*rational instinct*" as an appropriate one to denote its character; for as soon as the various creatures that are thus endowed attain the imago, or perfect state, they at once *instinctively* or intuitively perceive the relation between the various organs wherewith they are furnished and the materials on which they are intended to operate; and, without any experience or tuition, proceed at once to employ both organs and materials in a perfectly rational manner. This property is not susceptible of development. However complicated the actions resulting from it may be, they are, as a general rule, the same under all circumstances. In fact, a *negative* feature in "instinct" is the absence of *educability*.—SAMUELSON.

☞If, in spring, a stock of bees is not very rich in honey, and much cold weather comes to hinder their work, they will be in great danger of being ruined and lost. The brood increasing, the old store spent, and none to be got abroad, they all perish together. Therefore, the stocks that are fullest of bees, without a sufficient store, are in the greatest danger.—DR. WARDER.

[For the "Bee Journal."]

MR. EDITOR:—If the few lines I send you have not already been anticipated in spirit in your Journal, perhaps they may be of service to some who use the Movable Comb Hive, in uniting two or more swarms.

My method of uniting is this:—I take one of the stocks, and after placing it on an empty box, smoke them sufficiently to keep them quiet while operating, and brush all the bees from the combs into the box. Then, after removing the empty hive, place the other swarm to be united on the box, and in the same manner brush the bees from the combs. The bees, being deprived of their combs, mingle peaceably. Now, adjust all the combs that are suitable in one of the hives, and place it on the stand where it is to remain; then, before the honey-board is put on, set the empty hive (without frames) over the hive containing combs, and shake or brush the bees from the box into this empty hive, when they will fall directly upon the combs. With a feather, they should be stirred to facilitate their occupying the combs. Remove the empty hive, adjust the honey-board and cap, and the thing is done. I have done this repeatedly, and have never known it to fail. I use no bottom board fastened to the hive.

I would here make a suggestion.—If both queens were removed, and an Italian queen given them before they are returned to the combs, would they not receive her without risk? Perhaps some of your readers will test the matter, and give the result of the experiment.

One thing I may add, that although the two united swarms agree perfectly, robber bees are not permitted to enter the hive; as the bees, upon being restored their treasure, seem more than usually watchful. ARTHUR W. LUNDY.

Frenchtown, N. J. Sept. 18, 1861.

[For the "American Bee Journal."]

ITALIAN BEES.

About the 1st of August, 1861, I observed a stock of my bees, that had an Italian queen introduced the last of June, destroying the drones. I watched their actions for some time, and found invariably the young Italians engaged in this work. How is this? Is this duty always devolved on the young bees, or is it characteristic of the Italians? I have seen this stated by some to be the case.

I had an Italian stock, in August, that prepared to swarm (as stated in a former article), and had not two dozen mature drones or in any stage of development, the drone-cells being all filled with honey. R. B. O.

New Berlin, Sept. 10, 1861.

The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. X.

I shall conclude these articles with a concise discussion of two or three interesting topics.

1. *Do drones subserve any secondary purpose?*

Having already shown that the drones are males, I may add, as the result of all my observations, my conviction that the sole design of their existence is, the fecundation of the queen bees. I certainly am not aware that they are of any other or further use. Only those who do not know, or unconsciously ignore the fact, that the drones are males designed to fertilize the queens, continue to speak of other purposes which they are supposed to subserve. Among these, is the production and maintenance of the degree of heat required, within the hive, for the perfect development of the worker-eggs and larvæ; and hence they assume the drones to be *brood-bees*, and so call them. It is scarcely possible any longer to treat such a notion seriously, since it has been so frequently and conclusively refuted. Still, a few remarks may not be altogether superfluous. During the precise period in the spring—from March to May—when, if such were their design even secondarily, drones would be most needed, none are to be found and none are produced in the colony—unless it be, occasionally, a solitary individual, evidently born out of due season. Afterwards, when the weather has become warm, when thousands upon thousands of larvæ have successfully matured, and the hive is crowded with young and fully-fledged workers, so densely packed that numbers are constrained, by want of room and the heat in the interior, to cluster on the outside of the hive, hordes of drones begin to make their appearance! When they *might* be needed and wanted, as a sort of animated heating apparatus, they are among the missing; and just when not needed; when their services, *in this respect*, could be best dispensed with; when, in fact, a *refrigerator* would be more desirable than a *heater;* legions of them emerge and crowd every avenue!! As well might it be alleged that the heat of a smelting furnace, on a summer's day, with the thermometer at 98° in the shade, has the designed secondary purpose of keeping the workmen warm!

But then modern utilitarian philosophy sagely inquires—"If the fecundation of the young queens be the sole purpose for which drones exist, why does Providence cause so many to be produced, when one or a dozen would amply suffice? Would not this be counter to the known wise economy of nature, which does not permit the production of that which is of no use?" The usual reply to this is, that so large a number of drones is required, because, if only a few were provided, the queen might fail to encounter one in her excursions; and that these excursions are indispensable, since, to free the queen from perpetual annoyance by the rivalry of drones, it has been wisely ordered that sexual concourse shall not take place within the hive, but only on the wing and in the open air. But this is simply retorting on pseudo-rationalism by pseudo-rationalism. The reasoning is teleological, and I regard teleology even in theology (except where the revealed word warrants the inference with rigid mathematical strictness), as a presumptuous apotheosis of fallible human intellect. I would rather say—"the fact is simply so. God has so ordained that the queen bee and the drone can have concourse only after leaving the hive; and the production of a large number of drones, in a state of nature, must also be consistent with His Wisdom and Will, whose 'ways are past finding out.' He causes the fruit tree to produce millions of blossoms, and the anthers of those again shed myriads of sporules of fertilizing pollen, yet the result is the production of a comparatively small quantity of fruit, much of which again fails to perfect its seed." All this is so—the facts are patent to every observer. But it would be presumptuous arrogance and folly for finite man, with his limited faculties, to undertake to grasp them in all their unsearchable complexity, and presume to assign reasons for the multifarious operations of nature, as ordained by the infinite wisdom of the Creator. The facts must content us: we must be satisfied they are as they are, and not otherwise. Why they are so; and why God, since he has assigned only one queen to a colony, has not likewise allotted to her only one drone; and why he has not seen fit to allow the concourse to take place within the hive, I know as little as I know why he creates myriads of mites and millions of grasshoppers, or permits the hail and the hurricane to devastate the land. But this I know, that since God, who "doeth all things well," has so ordered it, it is well and wisely done.

2. *Are those drones which proceed from the eggs of fertile workers, virile males?*

Dzierzon first propounded this query, and answered it affirmatively—conceding their perfect virility. *Perhaps* I can furnish the evidence *a posteriori*. On the 2d of September, 1853, I broke

up a drone-producing colony, which I had expressly reserved in my apiary for investigation. I transferred to frames, the combs which contained from 800 to 1000 cells of brood in the various stages of development, and placed them in a Dzierzon hive. After immersing the bees in water, and carefully picking out and destroying all the drones, I introduced the bees and placed the hive in the bushy top of a willow tree, situated midway between my residence and the hamlet of Lower Doria—so arranging the dense foliage beneath, above, and around the hive, that it could not be seen. All the drones which thenceforward emerged, emanated from eggs laid by a fertile worker, for the colony had been queenless since the middle of June; and I presumed other drones would scarcely find their way thither at that season, as the nearest known apiary was at least a mile and a half distant. On the 14th of September, an unusually fine and warm day, I took from one of my colonies recently deprived of its queen, a sealed royal cell containing a maturing embryo, bedded it on cotton and carried it to the place where the hive was concealed. After satisfying myself that my proceedings had not been observed by any one, I ascended the tree, opened the hive, and inserted the royal cell in one of the combs. A considerable number of drones were then flying. Replacing the foliage, I so left the hive till the 30th of September, when I sent Günther for it. On his return we opened it, and soon found a queen, and also eggs and larvæ regularly placed in the cells. All the drone-brood had disappeared, the unmature having doubtless been destroyed by the bees, when the young queen became fertile. On the 12th of October, young workers emerged.

This experiment was one of the few successful ones made by me in that year. Days so clear and calm and warm, as were those from the 13th to the 21st of September inclusive, rarely occur here so late in the season; and hence there was every reason to expect that the queen, if perfect herself, would become fertile—provided those drones were truly virile. I said the experiment was successful, though the result does not furnish *conclusive* proof of that which it was designed to demonstrate. For it happened that year, in my own apiary, contrary to all usage, that one of my colonies, though containing a fertile queen in every respect perfect, retained its drones till the month of November. And, since, in 1844, one of the three queens which I had secluded, without drones, a mile and a half from the nearest apiary, still became fully fertile, it is obviously *possible*, though perhaps scarcely probable, that in this latter case, a drone from my apiary and emanating from a queen-laid egg, may have encountered and fertilized the young queen reared in the concealed hive. Again, it is also possible that a drone from one of the apiaries in Lower Doria may have found his way thither, though the distance is equally great. Both suppositions are highly improbable, but neither is impossible; and the result, consequently, is not *conclusive*.

3. *Diminutive Drones.*

By this term, I do not mean those drones which are merely somewhat smaller than the ordinary size, such as are occasionally seen, especially among those produced from the eggs of fertile workers; but such as are not longer than workers and scarcely perceptibly thicker. Some writers have mentioned cases where thousands of these diminutive drones are alleged to have been seen in queenless colonies. I shall raise no question about the number; but must take leave to deny that the colonies in which they were found, were queenless. They certainly had a drone-egg-laying queen. I have *never* seen the kind of diminutive drones to which I allude, in colonies producing drones only—whether the eggs were laid by an unfecundated or a superannuated queen, or by a fertile worker; but *always* and uniformly only in colonies in which the queen was able to lay worker-eggs also, and then only a few occasional specimens. I have always found the drones of drone-producing stocks, to be fully as large and as perfectly formed as those in colonies having a healthy, vigorous, fertile queen; and if, occasionally, one was seen somewhat less *bulky* or *more slender*, it was still, in every instance, of the full ordinary *length*. Worker-cells containing drone-brood, are always sealed with a more convex cap than drone-cells so supplied. Those cells, also, project considerably from the surface of the comb, and thus the larvæ can attain its full *length*. Lacking space, however, for *lateral* development, the drone-larvæ in worker-cells, while growing, exert a strong pressure against the sides of the cells—forcing most of them outwards and causing the destruction of some of the larvæ, in intermediate cells, in combs which were supplied with eggs in regular consecutive order. But most commonly, drone-brood is irregularly disposed in worker-comb, if the eggs were laid by a fertile worker; that is, the eggs are not placed uniformly, cell after cell, and row after row. In such case, the larvæ have or obtain ample room for *lateral* development, because there is little resistance to the pressure exerted against the cell-walls, and the drones emerge of full size. In some instances, also, though the drone-brood is placed in contigu-

ous worker-cells, the lateral pressure is not sufficient to cause the death of the compressed larvæ, and when those emerge, they will be somewhat *more slender* than the others, but nevertheless of *full length*.

None of these, however, are of the class to which I refer—diminutive drones of the size of ordinary workers. These, as I have stated, are always found few in number—rare individual specimens—in colonies having a queen that lays worker-eggs also. They are met with mostly in the spring, and seldom in summer; and invariably the colony producing such, speedily becomes queenless, if it does not seasonably rear a young queen. These drones are produced, here and there, in worker-combs, and their cells are sealed over with a *flat* cover, like those containing worker-brood, or at least the convexity is so slight as to be hardly observable, and what there is, may be the result of pressure from the drone's head, rather than of original construction. This *flat* capping is *the cause of their diminutive size*, restricting their *length* to that of an ordinary worker. They are slightly thicker than workers, as during their growth, they also exert some degree of pressure against the side walls of their cells. *The greater number of them perish just before reaching maturity.* In 1846, I found a few such diminutive drones in February, on the bottom board of a colony, among some immature worker-larvæ, which had been cast out of their cells by the bees; and these showed that the colony contained a normal queen. I could not, at the time, satisfactorily account for the phenomenon presented by the existence of worker and drone-brood simultaneously in a colony, so early in the year, and, therefore, broke up the stock for examination. I found a queen exhibiting nothing remarkable in her appearance. The combs contained comparatively only a small amount of brood, and this was not very regularly placed. I opened all the sealed cells with the point of a needle, and discovered a number of drone nymphs in the worker-cells, interspersed among those containing worker nymphs—*all uniformly sealed with* FLAT *covers.* I was now as much in the dark as ever. I transferred the queen and bees into a hive in which a colony had perished the previous winter. When the gathering season opened and the rape fields were in bloom, I found the combs well charged with drone-brood in worker-cells *sealed with highly convex caps*, and *full-sized drones* were flying in great numbers. No worker brood was to be seen. The queen was still alive and alert. Having then still full faith in the existence of special drone-mothers in every colony, my observations left me in the dark. Freed now, by the aid of Dzierzon, from that delusion, I have adopted the following hypothesis respecting the origination of the diminutive drones, based on what has come under my notice at various times. I suppose that when the supply of spermatic filaments in the liquid contents of the queen's spermatheca is nearly exhausted, she is no longer able to impregnate every egg she lays. But, being unconscious of her partial disability in this respect, she continues to oviposite in worker combs as theretofore, and thus some unimpregnated eggs chance to be deposited in cells, interspersed among those containing eggs duly fertilized. The former, of course, develop as drones; but their true character being unsuspected or undetected by the workers, their cells are capped with a *flat* cover. Thus cribbed in on all sides, their growth is repressed—the more rapid and vigorous progress of the worker-larvæ by which they are surrounded, preventing *lateral* expansion, while the *flat* cap precludes longitudinal extension. In this manner, I conceive, do these diminutive drones originate. The larger number, however, perish prematurely in their cells, being unable, from the peculiar structure of their mandibles, to perforate the *flat* cover by which they are confined.

I designate this as a *hypothesis*, because it is in reality nothing more. I shall embrace the first opportunity which the appearance of such diminutive drones in any of my colonies furnishes, to catch the queen and have her dissected. Should it be found that there are only few, or comparatively few, spermatic filaments remaining in the contents of her spermatheca, the fact would at least confer additional plausibility on this hypothesis.

ADDENDUM.

Commenting on the Baron of Berlepsch's ninth article, in which he treats of the time required for the perfect development of the queen bee, Dzierzon makes the following remarks:—

"The widely differing statements on this topic, given by various careful observers, result from their neglect to designate the precise time from which they began to count. We may date from the moment when the egg is laid; or from that at which it is hatched and the larva disclosed; or from the time when the larva is selected by the bees, for the production of a queen; and we should thus reach different conclusions. Again, *you* count from the laying of the egg to the time *when the young queen leaves the cell.* But even this term allows of considerable latitude, and does not fix the precise time required *for the maturing of the insect.* Circumstances may cause a young queen

to leave her cell while she is yet very tender and only partially colored, or induce her to remain therein several days after she is fully developed. The regularity with which the brooding is conducted, and the average temperature prevailing in the hive during the time, influence the process very materially and may shorten or prolong the period.

You state that I have heard a young queen teet on the eleventh day. That is a mistake: such is not the correct import of my expression. I have indeed found young queens *emerged* as early as that, but always in so delicate a condition, that twenty-four hours more were certainly required to give their physical organism sufficient rigidity to produce sounds audible by the human ear. As you have yourself heard them teeting on the twelfth day, there is no radical difference between our observations.

In my apiaries, the first afterswarm has frequently issued on the fifteenth day, but most commonly on the fourteenth. For the rearing of queens, bees sometimes select larvæ and sometimes eggs; the choice being determined apparently by the more or less favorable position of either, near the edge of a comb or of one of the passage openings, thus permitting the construction of royal cells without involving the destruction of other brood cells. Ofttimes, when preparing to expel a swarm from a box or basket hive, I have pruned off the lower portion of the combs, till the cells containing unsealed larvæ were reached; and have usually found that the royal cells were built along these cuts, close together, and extending downward so as to resemble the fingers of a glove.

That the queen emerges about three days earlier than the worker, was proved to my satisfaction by the following experiment. I inserted an empty worker comb in the brooding chamber of a populous hive, and three days after, when it was well supplied with eggs and some of these had already been hatched, I transferred it to an artificial colony, in order to have queens reared. The bees built four royal cells on the lower margin of the comb, among the cells which contained only eggs when the transfer was made. Nevertheless the first queen emerged two days sooner than the workers in the central portion of the comb, though the eggs there were laid at least one day earlier. Nor can a higher temperature in this case have caused the difference, since the worker brood in the cells adjoining the royal cells, enjoyed the same degree of heat as the latter, though it emerged much later. During the closing period of development, the maturing of the royal embryo proceeds with accelerated rapidity. When a royal nymph begins to assume a brownish hue, she will certainly be ready to leave her cell within forty-eight hours, if the ordinary temperature be maintained. Royal cells may also be slightly opened for the inspection of their contents; and if they be carefully closed again, so as not to tempt the workers to destroy them, the development of the embryo will not be prevented thereby—the queen will still emerge, full-fledged and active.

Seventeen days from the laying of the egg seem to me sufficient for the perfect development of a queen, provided the temperature is suitable and equable, and the brooding regularly continued. Though the result of your experiment with the nucleus of July 6, 1851, showed fully eighteen days, it may be remarked that the bees, suddenly deprived of their queen, may, in consequence of that disturbance, have omitted for a short time to cover the brood properly; and as the colony was weak and there was, therefore, a deficiency of heat, the larvæ doubtless developed more slowly than they would have done under more propitious circumstances. That such lack of warmth, and intermitted brooding would tend to check or procrastinate the development of an embryo queen, is sufficiently obvious. Hence, royal cells occasionally remain closed for an unusually protracted period. Delay in emerging may also, at times, be intentional—the young queen, though fully mature, dreading to encounter a rival, and keeping perdue till assured that she can issue with safety.

(For the "Bee Journal.")

It strikes me that the theory lately broached by Mr. Kirby (if I comprehend it,) is not altogether *new*, though it may be original with him. I think it is essentially similar to that advanced about a hundred and twenty-five years ago by the Rev. Mr. Purchas, in England, who says—"into the royal cells is injected a *spermy matter*, inclining to yellow, in which and out of which the queen bee is bred, being both matter of *generation* and *augmentation*."—THEATRE OF POLITY, *chap.* 8. The only material difference between the two, that I can see, is that Mr. Kirby concedes that the queen originates from an egg, while Mr. Purchas contends that "the golden matter of which the queen is made, is not turned into a worm, but immediately receives the shape of a bee. She is at first, (when she is visibly anything,) a perfect bee, in lineaments and shape, though not in magnitude and dimensions."

These theories involve a principle which wants sufficient evidence for its support; and assume as a fact the existence of *spermy* matter in the cells, which their originators have not proved can be found there, and which no one else has yet been able to discover. J. T.

Hartford.

[For the Bee Journal.]

The Italian Bee.

As many are engaged just now rearing Italian queens and bees, I would suggest that they write for the Journal the result of their observations, to the end that we may compare notes and see if thereby we may not be able to arrive at some facts, which may determine a few points in the economy of the hive, now confessedly involved in much doubt. Every one, so far as is known to myself, who are or have been engaged in rearing this bee, either here or in the old country, have noticed the great *want of uniformity in color of queens*, and not only this, but have also noticed that the *progeny* of some queens are much lighter than others, even while *all* show the distinctive marks of the Italian race. Mr. E. Kirby argues that *the workers*, in rearing queens from worker eggs, procure the drone semen, and feeding it with the royal larvæ, (or does he maintain *it is* the royal larvæ?) give a taint of the race from which it is obtained, to the new queen. I am disposed to doubt the correctness of his theory, for reasons which I shall presently give; but that *queens of all colors*, producing *workers and drones* of different grades of color, can by any possibility be pure Italian, I, with him, very much doubt. My own idea about it is, that the bees, in transforming a worker-larvæ into a queen, give her (the new queen) a pigment, so to speak, or taint of their own race. *How* this is done, I do not pretend to have discovered; but I have repeatedly taken pure Italian brood from an Italian hive, in comb of their own construction, and given it to the black race for the purpose of rearing queens. I have *uniformly* reared, in this way, queens of only ordinary or inferior colorings, while *their progeny* show a decided degeneracy from the original colony, although *all*, according to our accepted tests, are Italian.

In rearing queens by Italian bees, in their own hives, I as uniformly get finely marked queens. Some of these prove hybrid, on account of the proximity of my apiary to other bees; but those showing Italian marks are as fine as the original, while such as are purely impregnated, prove fully equal to any, and even finer still than the parent stock. Indeed, I have been, and am now, *increasingly* of the opinion, that *none are absolutely pure*, and if not, then they are susceptible of *improvement*; but to do this, something is yet wanting, if I am right in my conjectures. From my observations thus far, I am of the opinion that a queen of a certain grade, impregnated by a drone of the black race, produces progeny substantially similar to herself in part, while a part partake of the other parent; and if such a queen happen to meet a drone of the same grade with herself, then *all* show Italian markings, but less distinctively and beautifully than if *both* parents were of greater purity. Of course, if I am correct above, then the old theory falls to the ground, and *very great* care will be requisite to preserve and improve the Italian bee in this country.

In regard to the theory of Mr. Kirby, I have placed Italian and common hives in close proximity to each other, and several times reared queens, by transfer of Italian brood from the Italian hive to that of the black race. No *drones* were in the latter, and yet, while I uniformly got finely colored queens from the Italian hive, I *as uniformly* obtained only queens of indifferent or dark color from the black bees. If the bees obtained the *drone semen* while on the wing, as he alleges, why should *the queen* be differently colored in the different hives, since *all* would meet the same drones in their excursions? Again, he states that if a queen be disabled in one of her hinder legs, it will be impossible for her to copulate with the drones. On the 4th of July, while inspecting a colony, I found a young queen had emerged, minus one hind leg; I had not then seen Mr. Kirby's article, but felt chagrined at noticing her clumsiness, as she was a *very fine* queen; fearing that in consequence of her deformity, she might be lost. I was agreeably surprised, however, on the 7th—three days later—on opening the hive, in discovering that she had become fertile, having filled at least a square foot of comb with eggs. If Mr. Kirby, or any one else, will procure a good microscope and take a drone, obtaining its semen in the way he indicates and examine it, he will discover it filled with *millions of minute animalculæ*. Now, let him compare with this *the contents of a queen cell, at all stages of development*, and if he finds the LEAST TRACE of them, *then* I will give up. But there are no such things to be found in a queen cell, nor within a queen, till after her impregnation. Then, her sperm sac will, under the microscope, be found filled with *millions of them*.

MARTIN METCALF.

Grand Rapids, Michigan, July, 1861.

Mr. OTTO HEMMAN, of Weissenfels, states in the Bienenzeitung, that of twelve royal cells built on a comb supplied with eggs by a queen which died of superannuation a few days after, *nine* proved to contain dead drone-larvæ. It seems evident from this, that few spermatozoids remained in her seminal sac; and hence she unconsciously deposited drone or unimpregnated eggs in the worker cells.

[For the "Bee Journal."]

SERIAL publications devoted to a special department of rural economy, are too apt to be poorly sustained, and in many instances they have been obliged to discontinue. As important as the wool and stock interest has been to our country, it is only within a few years that a journal adapted to this particular branch of husbandry, has been for any length of time fully sustained. Even in England, where greater interest is manifested in all rural subjects, than in our own country, the "Poultry Chronicle," which was edited by a lady and conducted with considerable energy, was issued but for a short time. We wonder, with the rage for fancy fowls manifested by our countrymen, that no *Poultry Journal* has been attempted by some enterprising publisher. Periodicals devoted to gardening and horticulture, have, perhaps, succeeded as well as any devoted to a special object, and we have three or four honorable examples of this character. The fact is, our farmers usually take two or three agricultural journals, and these embrace most topics relating to rural affairs and farm life; hence, there is so little interest in receiving a work especially devoted to any one branch.

The AMERICAN BEE JOURNAL is a publication, devoted to the special department of Bee Culture, claiming from the beekeepers of our country a welcome support, which it most surely merits. From its first issue, I have read the numbers with a peculiar interest, and, I must say, I have been somewhat surprised to see the spirit, life and variety exhibited in its articles, selected and original, and all about the "little busy bee."

To the first establishment of such a publication, and especially at such a time as the present, there are many disadvantages and drawbacks to contend against, which those only know who have had experience in conducting works of this class. But as far as it has gone, it has shown that such a publication was needed, and if it were to be discontinued now, the thousands of intelligent and practical beekeepers all over our country, would sustain a loss such as only another work of the same kind could make up.

The first intimation I had that a journal about Bees was wanted, was contained in a query in the COUNTRY GENTLEMAN, Albany, N. Y., vol. XII, (1858,) p. 33, where W. J. E. asks, "could you not publish a cheap monthly periodical on Bees, in which the natural history and culture of bees could be discussed? Perhaps Quinby, Langstroth and others would be willing to furnish you with matter." After replying that they would be happy to publish all articles relating to bee culture in their columns, the editors say: "It would, we imagine, be a difficult matter, to say nothing of the support it would receive, to fill a monthly sheet with valuable contributions on the management of bees." But here it is, only two years after the above was written, and we have a practical and reliable BEE JOURNAL, filled each month with interesting and valuable articles upon the management of bees. And why should we not have such a publication? Surely the seventy thousand beekeepers in our country can maintain one. The subject is one of intense interest, the occupation is one of profit, and the BEE JOURNAL becomes as indispensable to those who have but a few hives, as to those who have extensive apiaries.

I promise you, for another number, some remarks upon beekeeping as a favorable pursuit for persons in humble circumstances.

Brookdale Farm, Maine. S. L. B.

[For the Bee Journal.]

BATTLE OF HONEY AND HUMBLE BEES.

As a contribution to the record of strange incidents, singular facts, and rare occurrences connected with the natural history of the bee, I send you the following article, cut from the "*Monmouth Merlin*" of September 19, 1846.

"On Thursday afternoon, the 18th instant, a farmer in the neighborhood of Twyn Barlwm mountain, in Wales, was watching his flocks, when suddenly his attention was attracted by a buzzing noise, and a cloud of insects which almost darkened the air. Upon closer examination, he found the multitude engaged in serious warfare, which lasted a considerable time, until heaps of the vanquished covered the ground, some without heads, others minus their wings, and others completely separated into two parts. They proved to be different sorts of the humble bee and the honey bee. A friend assured us that he scraped together three or four bushels of dead with his foot, and many persons carried away the slain in small basketsful, to show their friends the result of this very unaccountable warfare."

Coudersport, Pa. A. J. D.

(For the "Bee Journal.")

RED CLOVER.

I noticed in August and the beginning of September, while the bees were gathering honey from the buckwheat, that they obtained pollen of a brownish color from some source. On investigating the matter, I found that they collected it from the red clover. This somewhat surprised me, as I had never seen them gathering honey from the red clover to such an extent; particularly while other forage was plenty. It is true I have seen a few, in the fore part of summer, at the red clover; but they were very few. I have also noticed that the bees visited only those heads that were imperfect, the tubes being shorter in consequence.

New Berlin. R. B. O.

Food of the Larvæ.

It is an interesting inquiry, and one which has long engaged the attention of beekeepers, whether the larvæ of the different kinds of bees receive the same kind and quality of food, or whether the workers, the drones, and the queens respectively have each a distinct and peculiar pabulum administered to them. Pliny, one of the earliest writers who adverts to the subject, referred the brighter colors which distinguish the queen to the nutriment which she receives in her larva state, being composed, as he conceived, of the choicest essences of flowers. And the notion that her food was specially refined, highly aromatic, and exceedingly nutritious, seems to have so captivated the popular fancy, that nearly all the ancient writers and apiarians adopted it. The marvel is that while bees have been classified in almost every imaginable manner, as architects, wax-workers, varnishers, plasterers, judges, executioners, sextons, scavengers, scouts, guides, guards, nurses, &c., &c., to the end of the chapter, no one has ever thought of looking among them for confectioners and cooks, with the special function and prerogative of purveying for the taste and appetite of the humming household; and from whose science and skill hints might be derived for improving and prefecting our own *cousine*. Had they made themselves conversant with the mysteries of the hive, even Appert, Kitchener and Ude might possibly have lengthened out their heritage of fame a lustrum or two, by devising some novel *pate* or marmalade sufficiently delicious and piquant to have tickled the palate of an *Apicius*.

But—to get back to our potage, or rather that of the bees—some apiarians have tasted the jelly or paste on which the larvæ of workers and queens subsist, and endeavored to discover and attempted to describe the difference between the two; but failed to convey any adequate notion thereof to those whom they sought to edify and instruct. Others, doubtless lacking the exquisite palate of the bee, declared that the jelly aforesaid was a miserable, insipid, unsavory concoction, which, though it might be swallowed with gusto by vermicular gluttons, was far inferior to vermicelli or turtle-soup, and could never excite a tang on the tongue of an epicure. "*De gustibus non est disputandum;*" and we shall not undertake to "decide, when doctors disagree."

Now, seriously and *seriatim*. Huber speaks of a pure royal jelly, smooth, tart, and pungent. The Rev. Mr. Christ describes it as sweetish and spicy. De Morlot calls it spicy and subacid, well calculated to sharpen the appetite and promote digestion and assimilation; and says that, compared with it, the food furnished to the worker larvæ is merely an insipid paste somewhat like that used by bookbinders. Hofman says it has an acid taste, and resembles in appearance thickly boiled starch. Berlepsch describes it as an amorphous, viscid, mucilagenous, tasteless substance; but does not think with Dzierzon, that there is no difference in quality between what is fed to the royal larvæ and that which the worker larvæ receive, so long as the latter remains coiled on the bottom of the cell. Dr. Barth regards the royal jelly as differing not only quantitively but qualitively also, from the food of the worker larvæ. He says the former is white with a faint tinge of yellow, and is somewhat viscid or pasty; while the latter is nearly as clear as water, having only a slightly milky hue. Reaumur does not allude to any difference between the two. According to him the substance on which all the larvæ are fed is at first nearly insipid, but gradually receives an accession of sweetness and acescency. Dr. Bevan contents himself with adopting or at least quoting Reaumur's opinion. What Butler thought of it we do not remember. Thorley tells us that the queens are reared in "oblong orbicular cells," and that the larvæ therein are nourished "by a very select and peculiar matter gathered by the commons. What the said matter is, or whence it is gathered, is not easy to determine. Yet that it is really peculiar, and very different from that gross matter, which is employed in nourishing the other young, I cannot but conclude from what I have taken out of the royal cells, of a very different kind and quality; being of a gummy, glutinous nature; of a deep red, transparent; and would rather dissolve and melt in the fire, than crumble to powder." Debeauvys speaks of it as having a decided subacid taste. He, being a Frenchman and of course a *gourmand*, doubtless skilled in the mysteries of gastronomy and trained to appreciate nicely the flavor of such *viande de hautgoût*, we conclude by most complaisantly deferring to his judgment and considering this matter of *taste* settled beyond appeal.

Bruning believes that the royal larvæ are supplied not only with a much larger allowance of food, but that what is allotted to them is of a more nutritive quality. Scholtisz insists that while they receive much more ample supplies, these are of a peculiarly stimulating character, causing the entire organism of the queen to reach early the perfection of which it is susceptible—the ovaries especially to become fully developed. Dr. Dönhoff regards the obvious difference in the composition of the food prepared, as of great significance, in-

fluencing directly the greater or less complete development of the sexual organs. He states that during the first six days the royal, the worker, and the drone larvæ are fed with the same kind and quality of food, the first only receiving a much more lavish supply, so that it in fact swims in it. Thenceforward, while no change is made either in quality or quantity, in what is appropriated to the royal larva, a large admixture of pollen is introduced into that given to the worker and the drone larvæ. And he remarks as an important fact that, on the sixth day—precisely coincident with this change in the food,—the first faint traces of sexual organs can be discovered in the larvæ. He infers that the object and effect of the change is to check the further development of those organs in the worker. He regards pollen as detracting from the nutritious quality of the food, and rendering it less stimulating. This view comports altogether with the observations of Dzierzon, Berlepsch and others, that queens may be reared from worker larvæ up to the sixth day of their existence as such; and it thus appears that the repression of sexual development is contemporaneous with the admixture of pollen in the food. Prof. Leuckart concludes that these stand to each other in the relation of cause and effect—more especially, as sexual development becomes perfected in the royal larvæ, which is continuously fed on the unadulterated or undeteriorated food. These effects however seem to be restricted to the worker larvæ; for in the drone, which is believed to be fed throughout—though somewhat more liberally—with the same kind of food as the nascent worker, the sexual organs do nevertheless become perfectly developed. Nay, if a drone larvæ happens to be placed in a royal cell and is fed correspondingly, it invariably perishes—being "drugged to death" by the very pabulum which carries up the worker larvæ to the acme of perfection in development and organization, and advances it substantially to a higher stage of existence. No explanation of this singular fact has yet been given, though it serves to illustrate the adage that "what is one man's meat is another man's poison."

Berlepsch regards as untenable, though ingenious, the theory of Dr. Dönhoff and Prof. Leuckart, that the undeveloped sexuality of the workers, results from the introduction of pollen in their food while they are yet in the larvæ state. Since it has been demonstrated that common workers are produced in colonies which have not a particle of pollen in their hives, and at a time when the bees cannot gather any, he conceives it manifest that the pollen which the worker larvæ receives in its food cannot serve to check sexual development. Were pollen essential to this repression, he concludes that the bees produced while there is a total want of it in hive, would not be workers, but *diminutive queens.* But it is by no means easy to determine when there is an entire absence of pollen, or its essential equivalent, in the hive. There may not be a particle of it discoverable in the cells, and yet a store of it amply sufficient for the needs of the larvæ, may be reposited in the stomachs of the workers or their general organism. Berlepsch inclines to look for the cause rather in the comparatively sparse supply of food which the worker larvæ receive, and in the *honey* which is fed to them on the day before their cells are capped.

Such, and so various, are the opinions of those who have touched, tasted, and handled the daily bread of the infant bee!

[For the Bee Journal.]

About the middle of June, I removed the queen of a common stock, using her in forming an artificial colony, and inserting a royal cell containing an Italian embryo queen, nearly mature, in the hive from which I removed the queen. Next day, I found that the young queen had emerged and was kindly received. It never occurred to me that this colony might send forth a swarm, and I was therefore disagreeably surprised to find one issuing from it on the fourteenth day after the removal of the original queen. When introducing the swarm in a movable comb hive, I observed that the Italian queen was closely enveloped by a small cluster of bees, from which I liberated her. Scarcely had the swarm taken possession of the hive, when I found the queen on the bottom encompassed by another small cluster. I again liberated her, and then returned her to the parent hive, which she readily entered, and where she was joyfully received. I examined the hive daily, but found no eggs till the eleventh day: and from these, beautiful Italian workers afterwards emerged. I also examined the swarm repeatedly, and discovered that it contained a common queen, which had doubtless issued from her cell while the bees were departing, and accompanied the swarm. But why did the bees prefer the to them then yet unknown common queen? And why did they reject the Italian queen with which they had been familiar for thirteen days? I incline to solve these questions, by supposing that they regarded it doubtful whether a queen which had not begun to lay within this protracted period, would ever become fertile, and turned more hopefully to the younger just emerged stranger. Or did the community of race induce them to give her the preference? D. H.

[For the Bee Journal.]

ON THE HYBRIDIZING OF THE BLACK AND ITALIAN BEE.

Truth is never made less by investigation, and by it knowledge is attained and errors exposed; and this becomes particularly truthful when applied to bees and their culture.

In the January No. of the Bee Journal, page 16, there is an article by the Rev. Geo. Kleine, giving a history of the Italian bee in Germany, and the effects of their hybridizing with the common or black bee, which contains much useful information in reference to mixed breeds of bees, but the question as to *how* they become mixed he has left somewhat enveloped in mystery.

By strict observation of the natural habits of the bees in their reproduction I have come to a different conclusion from other writers on this subject. I believe that the Author of Nature has established a principle in their seed, or the laws of their reproduction, which forms the three distinct kinds in their physiological organism and their propensities. I do not believe that the food or size of the cells have anything to do with the formation of their sexes. I do believe that the queen, workers and drones are made such by impregnation at particular times: first, to form the queen; second, her ovary, to form drones; third, the egg deposited from the drones in the queen's spermatheca, to form workers.

I have yet to learn that a pure Italian queen can be perfected artificially, in a hive or nuclei of black bees and drones, by eggs of an Italian queen laid in the comb of said black bees. They will be made mongrel, by the semen of the common drones. Dzierzon says, on page 18, "the fragmental dash of foreign blood exhibits itself *especially* in queens." Now it seems to me that what he considered as a phenomenon would easily have revealed itself to his mind, had he considered and allowed the fact that it requires the drone's semen to perfect the royal larvæ and immature queen, which would give the "fragmental dash" spoken of, to the whole progeny.

Dzierzon could not account for the phenomenon —that the hybrid queens, either Italian or black, produced progenies that were half each, not only in kind but in number; while a portion only were of a clearly mixed or mongrel breed. Likewise it occasionally occurs when pure Italian queens, fecundated by black drones, produce a brood of the one variety or the other.

Rev. Geo. Kleine, after giving Berlepsch's opinion on hybridizing, says, the cause of the phenomenon referred to is to be sought for in the fact that some of the queens were genuine and others mongrel, some to a greater and some to a less extent. My advice would be to seek for it also in the drone's semen used in perfecting young queens.

I will now give an explanation of my theory by which hybrids are made: 1st, it is well known that the copulation between the Italian queen and black drone produces hybrid workers. Also, worker larvæ of such queens taken to perfect queens would also produce mongrels. I will suppose that a colony of Italian and black bees are placed near each other, and each have young queens to be impregnated. As they fly out to meet the drones, they will meet those of an opposite kind, in which case their progeny would be mongrel; some in their marking *appearing* to be genuine; some resembling one kind and some the other; but all of them are mongrels. As it often happens that they leave the hive on their flights on several days, we suppose, for illustration, that the next meeting of this queen takes place with a pure drone of her own species. The result of this meeting is a progeny pure of her own kind; and the final result is, a brood from the same queen is made up of both genuine pure stock and mongrels; and the finding of such progeny has been a question which has long puzzled the Germans, as to how came they so. The workers carrying the semen to the hives promiscuously, may affect the progeny.

The physiology of reproduction is such that the seed of the male will impregnate certain ovaries in females that produce their progeny in broods; and the seed of two different males in the same female never blend together. We have illustrations of this in the canine species and our common fowls; the female, at the same litter, producing genuine and half breeds; and we now have the same results in bees. I have endeavored to avoid repetitions of what I have before written, and will close by calling your attention to one word, which is incorrectly inserted in my article on page 152, in July No., in line 24 substitute *well* for *not*, so as to read—how the queen obtains semen in her spermatheca is *well* known.

E. KIRBY.

Henrietta, N. Y., July, 1861.

☞When the larva of the bee is arrived at a certain bigness or stature, the bees closely seal it up, taking no further care about it than by a natural heat to cherish the brood and hasten its birth. There it lies hid from the eyes of all living, seems to be entombed and buried in its grave, without the least sign of life. Yet, have patience, and you shall see the noble creature rising as it were from the dead, perfect in all its parts, and in the most beautiful form, far more glorious than that laid down. A most lively emblem or image of the resurrection!—THORLEY.

Queen or No Queen?

In common hives, from which the combs cannot be lifted for examination, it is, at times, exceedingly difficult to ascertain, as early as is desirable, whether the colony has succeeded in raising a queen, after the old one has departed with the first swarm. This is the case, particularly where the beekeeper is a timid spectator and unaccustomed to lifting his hives and inspecting the condition of the combs. Forty years ago, Knauff published the following method of determining the fact, and Judge Busch recently stated that he has frequently tried it, and always found it reliable.

"Early on the morning of the twenty-eighth day after the first swarm has issued, accompanied by the queen, tilt up the hive gently from one side. If the drones are then seen crowded together on the bottom board, the colony contains a fertile queen engaged in supplying the cells with eggs. If the drones are not so seen there, the colony is queenless. This should be done about five o'clock on the morning of the specified day."

Judge Busch adds—"If, after swarming, the parent hive be removed to a new location and the swarm placed in its stead (as is my invariable practice), the indication above referred to may be looked for at a much earlier period. The parent colony then loses suddenly so large a portion of its population, that all the royal cells, save one, are immediately destroyed, and the young queen will become fertile much sooner than if after-swarming be permitted. Generally, especially if the weather be bad, the expulsion of the drones will commence in about two weeks after the swarming and the removal of the parent hive; and if this hive be lifted early on the morning of the fourteenth day, the drones will be found crowded on the bottom board, if the colony has been successful in rearing a queen and she has become fertile. The workers will then no longer tolerate the drones in the upper part of the hive, or in the vicinity of their stores, but drive them down, preparatory to their forcible expulsion."

All this is of course needless where movable comb hives are used; but it may be of service to those beekeepers who still retain the old-fashioned hives. It is always important to know, at the earliest moment, the real condition of a colony which has sent forth a swarm, so that if it prove to be queenless, it may forthwith be supplied with eggs and larvæ, have a sealed royal cell inserted, or be provided with a fertile queen from the nuclei kept in reserve.

☞Please send us names of beekeepers.

[For the Bee Journal.]

A brief chapter of the present season's experience will, I think, explain the "mystery" of your correspondent, M. M. Baldridge.

I had a beautiful Italian queen to remain unimpregnated. A very slight defect in one wing was the only apparent cause. After several weeks the only brood the hive contained was a piece four or five inches in diameter, of drone brood, in worker cells. These were greatly elongated, each cell rounded out and intermediate one vacant, apparently to give room for the enlargement. The queen was removed and three royal cells were immediately constructed, one near the edge of this circle of drone brood, and two near the middle. These two, on being extended had their upper sides attached to a slender stick of wood, which had been placed horizontally on the next frame, to hold the comb in place. The removal of this frame after the cells were sealed exposed two large sized larvæ with an abundant supply of royal food. The third one remained, and being to all appearance a perfect royal cell, I watched it with great interest expecting to be possessed of a royal drone, and was planning how I could have one of my finest Italian queens impregnated by it. The time soon passed when this new-born prodigy should have made its appearance, and on opening the cell I found what I should say was a half developed chrysalis, in a state of partial decay. The head was quite distinct but small.

In the case described by Mr. Baldridge, it was not known what was produced. From these facts I conclude it was an attempt by the bees to rear a queen from the drone larvæ of an unimpregnated queen. Neither is it entirely singular that this should have occurred in a hive possessing a queen, which appears to have been the case, according to the statement. Nor is it very remarkable, if that was the only egg the queen had laid, as most cases prove that, under the circumstance, the number is quite small. L. PEIRCE.

Ercildoun, Sep. 10th.

☞When the combs in a hive are built or placed longitudinally from front to rear, it is termed the *cold arrangement.* When built or placed transversely or from side to side across the hive, it is termed the *warm* arrangement. And when they run diagonally, it is termed the *intermediate* or *irregular arrangement.*

The *cold* arrangement is usually preferred, as affording the best facilities for the labors of the bees, allowing them the readiest access to their stores in winter, and best promoting the proper ventilation of the hive.

[For the Bee Journal.]

Bees Destroying their Brood.

J. F. Martin, on page 209 of the Bee Journal, asks the cause of a colony of his killing its young and removing them from the hive. He states he has "examined the hive and found nothing the matter." It would have been more satisfactory if Mr. M. had given the exact condition of the swarm —its strength, amount of stores accumulated, amount of brood, the state of honey resources at the time, and the weather.

I have noticed this destruction in several instances, and attributed it to various causes:

1st. Last September I removed a hybridized Italian queen from a Langstroth hive, and put her with the bees that were upon the frame with her, in a small box holding ten frames five inches square, and wintered them successfully in it. I filled the frames with empty worker comb, except two, which contained sealed brood, which I consider important to give, to maintain the strength of the colony; without which a nucleus (especially if engaged in raising a queen), unless very strong, will become too weak before it has hatched brood of its own. This is more important late than early in the season. I fed them sparingly every day, and in a few days the combs were mostly filled with eggs. I then fed more lavishly, and the bees began displacing eggs and larvæ to fill the brood cells with honey; showing their instinct for storing honey to be greater than their love of young. This would be a costly experiment with a large colony. M. M. Baldridge, of Niagara Co., N. Y., had this destruction of young occur early in the season last year, with a powerful stock that he neglected to supply with surplus boxes; and sent an account of it to the "American Agriculturist." Massacre from this cause must be of rare occurrence, for bees generally swarm when their hive is well filled with stores, harvest good, and they are crowded for room.

As bees do not leave the hive until a week old, and do not gather honey the first fortnight of their life, the few old bees that remain after a swarm has issued, generally do not much more than supply the wants of the young bees and larvæ for a fortnight to come; which gives the young queen a favorable opportunity to increase her army of workers, by depositing in the recently vacated cells.

2d. Bees, when on the brink of starvation in spring, will sometimes destroy their brood, sucking dry the bodies of the larvæ. The queen then almost ceases to lay, and desertion or starvation follows, unless they are assisted. I mention spring, being the only season I ever remarked it, but I see no reason why they may not do so at other times, if brought into the same condition; which may happen at any season by robbing.

3d. It sometimes occurs that a weak colony extends its brood over more comb than it can cover and keep warm, when surprised by a sudden change of temperature, which, when it lasts for several days, is sure to kill the brood in the unprotected combs. The same thing sometimes occurs when a colony is placed in too large a hive for its strength. Also if, in removing frames containing brood, they are not replaced as found, but store-combs placed between. Thus isolated, if the colony is too weak to cover them all, the eggs and larvæ will be either neglected or removed from the unprotected comb or combs. When neglected, an intolerable stench arises from dead brood, which infects the hive for some time.

4th. Bees so build their comb that they can command every cell, and if in removing comb, it is not replaced in its original position, wherever it is winding and comes in unnatural contact or nearness to the next, the workers will cut a passage so that they can command every cell, generally leaving some points or lines of attachment. If the cells thus out of line contain eggs or brood in any stage of development, they are sacrificed to the science of bee-architecture.

I once, in searching for a young queen, placed the frame on which she was too near the next frame and not in the position I found it. The queen at the time had her head in a cell. The comb at that point projected a good deal. Two days after this I searched again for the queen, to show her to a friend. I found her in the position in which I last saw her, nearly starved and past recovery.

Colonies infested with worms are often seen carrying out imperfect and mutilated bees.

Queen cells are frequently cut down by want of care in replacing combs at the proper distance after examination.

E. P.

☞Royal cells containing queens nearly ready to emerge, must be handled with great care when removed from the comb to which they are attached, and inserted in another. The embryo is then still soft and delicate, will be injured or crippled if the cell be shaken or accidentally let fall, and defective wings or other malformation may be the result. When inserting a royal cell, we must be careful also to place it so that the bees cannot readily have access to its base, from the rear or the opposite side of the comb, or they will be apt to open it there and destroy the embryo. In such case, a circular opening is made, and the apex and sides of the cell remain closed; and on a cursory examination, the observer would suppose that the queen had not yet emerged, though long since destroyed.

Farmer's Club Talk.

Bees and Bee Hives.—H. STEELE, of Jersey City, exhibited a box of honey, to show the plan of working movable frames. An ordinary box, with glass sides, such as are used four to a set, on top of a hive, has three light wooden frames that fit in the box, the upper slats of which close the top of the box, and in each of these the bees make a sheet of comb, about six inches across each way, which can be taken out separately, and proves much more convenient than where the comb is attached to the sides of the box.

[What is valuable in this arrangement is not new. Top boxes for surplus honey, fitted up with suitable frames to receive the combs, have been in use ever since the movable comb principle has been adopted in practical bee culture. Instead of having the upper slats of the frames constitute the top of the box, it will be found more convenient, on trial, to have the frames arranged in the customary manner, with a separate top or cover for the box.]

Bee Moth Protectors.—Mr. STEELE also showed his plan of keeping moths out of bee hives, which we have heretofore described, but the plan has proved such a good one, that it is worth calling attention to it again. It is a frame, about one inch and a half deep and twelve inches long, with six or eight half-inch holes through it, in each of which hangs a tin door, one half opening out and the other opening in, which hang so lightly that they do not interfere with the passage of the bees, for they directly learn how to push through, but the moths cannot pass. In addition to this, to give ventilation, he has a frame several inches wide under the edge of the hive around the other three sides, with large openings covered with wire-gauze. Some recommend instead, to have a hole through the bench under the hive, say six inches square, covered with wire-gauze, and then fix the little frame that holds the trap-door entrances in the side of the hive, so that it can be taken out, if necessary, to give free passage for the bees, when moths are not dangerous. The cost of these moth-traps is only 13 cents each, and one might save a hive worth $13.

[There has been much "ingenious thought" wasted on fanciful contrivances; and this is one of the number. It may indeed prove to be literally a bee moth *protector*, but certainly will not secure a colony from the ravages of the worms. A beekeeper who has zeal and taste enough to think of adopting any kind of improvements, will hardly stop short of introducing the movable comb hive in his apiary and learning to use it as it ought to be. When he has accomplished that, he will want neither bee moth protectors nor special arrangements for ventilation, as he can easily get the worms out and let the air in, when he has occasion to do either.]

Dr. TRIMBLE, the special entomologist of the Club, said he had seen the moth-trap in operation, and highly commended it. He also gave the Club the benefit of a somewhat oft-repeated dissertation upon the subject of the value of bees in fertilizing flowers, declaring that many of them would remain barren but for bees and other insects; and that the reason why the first clover blossoms were barren, was because there were at that time no humble bees to fertilize them, as they alone have tongues long enough for that purpose.

The CHAIRMAN intimated that the gentleman knew not whereof he spoke.

ANDREW J. FULLER—I want to know if this Club will sanction the remarkable doctrine about bees fertilizing flowers. If it does, I dissent. I don't believe in the necessity of bees to fertilize clover or anything else. I know, as all other gardeners do, that Nature has other sure ways to effect this object without having recourse to bees.

Mr. BERGEN, an old gardener—Certainly bees do not fertilize wheat by carrying the pollen from one head to another, because they do not work upon it. I don't believe it is necessary for the bees to carry pollen from one plant to another to fertilize anything. It is true that their acts do hybridize flowers, and sometimes very much to the injury of gardeners, but that plants would not be fruitful, if it was not for bees, I can't believe.

[No one, we believe, has ever contended that bees are absolutely indispensable for the fertilization of *all kinds* of blossoms; but that their aid is at least highly essential in the cultivation of some kinds of fruit, is no longer to be questioned. The fact has been repeatedly demonstrated since the modern "Orchard Houses" have come in vogue.]

Mice in Bee Hives.—WM. S. CARPENTER stated that he had lost more bees from the mice getting inside, than from moth. What will prevent their depredations? Certainly not this moth-trap. They get in the hive, whether to eat the honey, I cannot say, and make nests there, which finally destroys the swarm.

Dr. TRIMBLE said that the common house mice never troubled bee hives. It is a sort very rare in this country. It is somewhat Kangaroo-shaped, with a long slim tail.

[Mice will rarely attempt to enter a properly constructed hive well filled with bees. In the fall, when the population diminishes and guards no longer protect the entrance, this should be so contracted as to permit the passage of only a few bees at a time. When this is done, and there are no holes or crannies in other parts of the hive, mice will not have an opportunity to enter and commit depredations. The common field mouse is the only one which shows much disposition to be troublesome in this way.]

Stingless Bees.—Bees in Honduras.—A discussion upon this variety of bees ensued, brought about by the circumstance of Mr. Gore, of New Jersey, who is about to emigrate to that country, in company with about 70 persons, to form a colony. Mr. Gore said he had been told that the bees of that region do not store up honey.

SOLON ROBINSON—That is undoubtedly an error; else why do the inhabitants keep such quantities of them around their dwellings. It is true, they

do not store it in wax combs, like our bees, but in sacks, some of which are as big as hen's eggs, and these are attached all around the sides of the hives.

[The Mexican and South American stingless bees might probably be made a source of profit in their native latitudes, if their instincts and habits were thoroughly studied and well understood. They are not suited to northern climates, and cannot be preserved here, as mere curiosities, without great care and difficulty.]

Bee Culture in Common Hives.

No. IV.

BY F. W. GUNDELACH.

A well stored populous colony from which a natural swarm has issued in the spring, usually sends forth a second swarm on the tenth day thereafter; and this swarm is accompanied by a young and unfertile queen.

A colony from which a forced or artificial swarm has been driven, will not yield a second swarm naturally *before* the thirteenth day, unless the bees had already built royal cells when the artificial colony was drummed out; but usually the second swarm issues on the fourteenth day.

Second swarms, as I have before remarked, are never so contented and tranquil as first swarms, because the bees have much less attachment to a young and unfecundated queen, than to an older and fertile one. They are also much more disposed to abscond, because the young queen, whose abdomen is yet unburdened with eggs, flies rapidly and with ease, and finds no difficulty in following or accompanying the bees whithersoever they choose to wend their way. This makes it necessary for the apiarian to be "on hand" when second swarms may be expected, and be in readiness to secure and hive them when they issue.

To prevent the absconding of these swarms, I employ a tin syringe, two feet long and $1\frac{1}{2}$ inches in diameter, having an iron or steel piston-rod, and a nozzle perforated with numerous very fine holes. By means of this instrument, I can project a stream of water twenty or thirty feet high, causing it to spread and descend like a gentle shower of rain; and when this is so directed as to fall among the swarming bees, they speedily alight and cluster. As soon as they have settled, I proceed to hive them in the good old-fashioned manner, if they are suspended where they are easily accessible. When all or nearly all the bees have entered the hive, I immediately carry it to its destined permanent stand—taking care, however, to place it as remote as possible from the parent hive, and also at some distance from any other hive, that the young queen, when returning from her excursion, may more certainly find her own proper home.

For the purpose of more easily securing and hiving swarms which happen to cluster on limbs or branches of tall trees, where they are difficult to be got at, even with the aid of a ladder, I have constructed a hiving apparatus which is both simple and cheap, and answers its design exceedingly well. I formed a ring or hoop, twelve inches in diameter, of half-inch iron wire, and across its diameter I placed a straight piece of the same wire, fourteen inches long, so fastened as to leave one inch of each end project over the periphery of the hoop, to serve as pivots or axes on which it is to swing when suspended. I then attached to this hoop the mouth of a muslin sac, $12\frac{1}{2}$ inches in diameter and 18 inches long, turning the margin of the muslin over the hoop and sewing this in securely. I next prepared a piece of oak wood, 18 inches long and 2 inches square, by boring a $\frac{3}{4}$ inch hole through it $2\frac{1}{4}$ inches from each end, and a $1\frac{1}{2}$ inch hole midway between these. In the outer holes, I inserted two uprights of oak, two feet long and one inch square, reducing two inches of one end of each upright, sufficiently to fit them tight in the $\frac{3}{4}$ inch holes of the first piece. Thus fitted in, they form the two prongs of my hiving fork. Two inches from the projecting end of these prongs, and on the inner side of each, facing each other, I bored a half-inch hole through, to receive the pivots or axes of the hoop, reducing these slightly by filing, so as to let the hoop and its appended sac play freely when suspended. Now, inserting one end of a pole in the $1\frac{1}{2}$ inch hole bored in the first mentioned piece, I can elevate the hiving sac, and it will always swing vertically, mouth upward, whether the pole be held perpendicularly or obliquely; and by adapting the length of the pole to the height at which the swarm has clustered, I can place the mouth of the sac immediately under it, to receive the bees when shaken down. I have also two other light and strong poles, one of which has an iron hook fastened to one end of it, and is used to draw down and shake or jar the limb or branch on which the swarm has settled, after the hiving sac has been elevated; and the other is in like manner armed with a hand-brush, by which the swarm can be swept off into the sac, when clustered on a limb too stout to be shaken by means of the hook. With this apparatus, I can readily secure swarms, though lodged in dangerous positions or where they cannot otherwise be conveniently reached.

When a swarm clusters in a low bush, hedge, or other place where it is not easily accessible, I use an empty basket hive, a bottom-board, a wing, and a bellows for securing it. If, for instance, it is lodged in a currant or gooseberry bush, I push the bottom-board under the bush, along the ground, till it touches the stem or stems —placing it, as much as practicable, directly below the swarm, and bedding its edges in the ground so as to prevent bees from getting under it. I then place a piece of old linen loosely rolled up, like a segar, in a brass tube fitted to the nozzle of my bellows (which is double-acting, and throws a regular and uniform stream), and kindling it, I am ready to commence the operation. Brushing down a handful of the bees on the bottom-board, I instantly invert the empty hive over them, with the entrance in the direction of the cluster. These detached bees immediately begin to hum at the entrance. In the absence of the queen, however, they would not long continue to do so, but return to join the swarm. Anticipating this, I resort to my bellows, and commence blowing smoke on the swarm from above, and generally succeed, in two or three minutes, in driving down the entire mass on the ground or the bottom-board. The joyful humming of the bees at the entrance of the hive, soon attracts the descending crowd, which at once rushes forward in a broad stream, thronging the narrow passage, to take possession of the new-found dwelling. When this stream begins to rush in the desired direction, I cease to drive them with smoke, but elevate the hive slightly, by gently shoving a few thin wooden wedges under its edges, to facilitate the admission of the eager and fast-coming multitude. If they were annoyed by smoke at this period, they would be apt to take wing, and if they did not abscond altogether, might cluster in a worse place, or at least render a repetition of the operation necessary.

Ordinarily, I put my second swarms in empty hives. There is not so great an advantage in giving these furnished hives, as in the case of first swarms, for they generally come at a period when pasturage is plentiful. And, moreover, as a week or ten days will usually elapse before the young queen begins to lay, cells enough will be built for her accommodation before they are really needed for the reception of eggs. The case is otherwise with the fertile queen of a first swarm; for she is ready to begin laying eggs as soon as the bustle of hiving is ended.

☞It is not the season alone, nor the length of time, nor the number of months, but the plenty, penury, or want of materials to employ them and work upon, that determines the labors of bees.—THORLEY.

[From Dzierzon's "RATIONAL BEE CULTURE."]

Foulbrood.

Unquestionably the most grievous and devastating evil that can befall the beekeeper, is the introduction and spread of foulbrood in his apiary.

This disease, as its name denotes, does not attack the mature bees, but the young brood exclusively, which generally dies and putrefies after the cells have been sealed; though the larvæ also are not exempt from its ravages. The worst feature of this malady lies in this, that not only is the brood destroyed, but the cells likewise are so contaminated that not only does the disease become continually more and diffused through the hive, from cell to cell, but, owing to its contagious character, it spreads from hive to hive, and from one apiary to another, if effectual remedies are not at once employed to eradicate it. Nor can the hives in which it has existed be safely used again, for a considerable time after they have been emptied.

When, among healthy brood, a few cells are found here and there, containing a smeary viscid matter, or a greyish-brown or black crust-like substance—the dried remains of larvæ or nymphs—it may be regarded as the unmistakable evidence of the existence of foulbrood. If the larger number of the cells are in this condition, this disease must have prevailed in the hive for some time, and have attained an aggravated stage. In common hives, where the combs are not movable, the evil announces itself by the disagreeable fœtid odor issuing from the entrance, and which resembles that of putrifying glue or animal matter. The bees endeavor, at times, to remove some of the dead larvæ before putrefaction commences, and thus we may occasionally find such on the bottom board of the diseased colony. They also attempt to detach and cast out of the cells the dried black crust-like substance. This may then be found among the droppings, and if rubbed between the fingers, emits the above-described fœtid odor.

Colonies thus afflicted do not build new comb in the spring, when other colonies are busily engaged in such labor, or do so only if they are still populous and pasturage is unusually abundant. If the combs be pressed asunder, we shall see that the brood is not placed regularly and uniformly; occupying rather isolated spots; and on cutting out a piece of such comb, we shall generally find, in the putrid matter contained in the cells, ocular proof of the existence of the disease.

There are two kinds of foulbrood. The one is curable and rather innoxious; the other is pestilential and incurable. Nevertheless, both are contagious.

The curable kind presents itself in this form: The unsealed larvæ die while yet lying *coiled on the bottom of the cell*, become putrid, and dry up on the bottom into a crust-like substance easily removable. Such of the brood in the cells intermixed with those diseased, which does not perish before capping, for the most part remains healthy and matures in due time; though we occasionally meet with exceptional instances of putrid nymphs in such capped cells.

In pestilential foulbrood, precisely the converse of this occurs. Here the brood does not perish till after it has been capped and begun to undergo its metamorphosis. The putrid mass is then not found on the bottom of the cell, but on the horizontal portion of the cell walls. It is brownish and viscid; and, in consequence of the heat of the hive and the admission of air through a small orifice in the sunken cap, it dries up as a hard black crust which the bees cannot detach, and which they can only remove by totally destroying the cell.

The spread of this dangerous disease is commonly the result of feeding honey obtained from infected colonies, or which the bees themselves procure from hives in which such colonies are lingering out their feeble existence. If this happens at a time when the healthy colony contains unsealed brood, the disease will pretty certainly be generated, though it may not make its appearance immediately. In an emergency, honey taken from colonies so diseased may be used for feeding in the fall, when the hive to be fed *no longer contains brood;* but it should never be given to them in the comb, for if this should inadvertently be left remaining therein, foulbrood may easily be the result of such feeding, soon after brooding is recommenced. Though it is certain that while one section of a double or twin hive was suffering exceedingly from the ravages of the disease, the other section remained wholly unaffected; it is equally certain that to stocks standing in close proximity to one which is so suffering, the infection may very speedily be communicated. Nay, the beekeeper himself may convey it from hive to hive, if after performing some operation on a diseased stock, he proceeds to work at a healthy one, without first carefully washing his hands and the knife or other instrument which he has been using. One who has a large apiary, will find it highly advantageous to remove from his premises at once, every colony in which he discovers symptoms of foulbrood, placing them, if possible at least two miles from any other stocks or apiary. The least troublesome and most efficient mode of arresting the disease, is immediately to sacrifice the colony in which it makes its appearance, stifling and then burying the bees, and burning up the hive with its contents.

The remedial treatment of diseased stocks, varies according to the season of the year when the disease makes its appearance or is first discovered, and its more or less virulent type. The curable kind, which not unfrequently occurs spontaneously, or rather, is generated when the bees are gathering stores from certain species of plants or trees, such as the German heathberry (*Vaccinium myrtillum*), and the various kinds of spruce, hemlock, &c.* This type of foulbrood not unfrequently disappears again, under favorable circumstances, when a change of pasturage ensues. But the beekeeper cannot calculate on such result. The disease may at almost any moment assume a more virulent form, spread rapidly, and prove exceedingly devastating. To arrest it, the queen should immediately be removed, when a single cell containing such diseased brood is discovered in a comb; and she may be used with advantage in the spring or early part of summer, for supplying an artificial colony, or be given to a hive from which a forced swarm is driven. If the bees for the artificial colony are taken from a healthy stock, no fear need be entertained that the removed queen will communicate the disease. But if the transfer of some of the workers of the infected stock also, be unavoidable, the artificial colony must first be put in an empty hive, and so kept for forty-eight hours; giving them some pure honey or dissolved candy after they have been confined seven or eight hours—feeding very sparingly even then. When finally placed on their destined hive, the queen must still be kept confined several days, to prevent the production of brood, till the bees have fully digested all the infected honey brought from the diseased stock, and can prepare pure food for the larvæ.

As no eggs are laid in the old hive after the removal of the queen, there will in a few days be no larvæ remaining to be affected by the disease; and before the young queen is reared and begins to lay, the workers will have had ample time to cleanse the cells thoroughly. They will do this the more effectually if the combs be so shortened, by pruning, that they will be completely covered by the bees. The new brood will usually be found healthy, and the stock will speedily recover. This result however would be more certainly attained, if all the old combs were removed as soon as the

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* We have for some years suspected that some species of evergreens are the chief source from which foulbrood *originates*. But from its contagious character, the disease may obviously become diffused in various ways.—Ed. B. J.

brood has emerged, and the bees transferred to a clean hive. But this can be done conveniently only where movable comb hives are used, and is an additional proof of the superiority of such hives. It is not safe to transfer the stock bodily into an empty hive, and require them to build new combs, unless the bees are numerous and the pasturage is still sufficiently abundant to enable them to gather the necessary supplies.

As an additional precaution against a recurrence of the disease, the young queen may also be removed after she has become fertile and has supplied a few combs with eggs—using her for building up an artificial colony or supplying one that has become queenless. In fact, the most profitable use that can be made of stocks infected with foulbrood, is to devote them to the rearing of young queens. But as, after the removal of the first queen, they will be unable to rear one from the brood in the hive, if the larvæ selected happen to be infected, they should in the first instance be supplied, if possible, with a sealed royal cell from some other colony; or when this cannot be done, a piece of comb containing healthy larvæ should be inserted. Subsequently, there is less likelihood that the selected larvæ has been infected, and they may be allowed to rear queens from their own brood. Thus employed, diseased colonies may in reality be made as profitable as those which are healthy, producing a number of queens in the course of the summer, and yielding some surplus honey besides. Such operations may be safely made, since it is a well ascertained fact that the queens do not communicate the infection to the colonies in which they are introduced; and the beekeeper in whose apiary foulbrood makes its appearance, will find it advantageous to have always on hand a supply of supernumerary queens. His constant endeavor must be to raise young stocks, so as to be able to break up in the fall every colony respecting the healthiness of which the least doubt may be entertained. It would be folly on his part to undertake to winter stocks suspected of being infected, while hundreds are annually *brimstoned* for the sake of their honey and wax. It is besides utterly inexcusable to retain an incurably diseased colony in autumn, because it happens to have formerly been an excellent one. Even in the spring such a colony should at once be destroyed when the nature of the malady is ascertained; taking pains to do it without permitting bees from healthy stocks to appropriate any portion of the honey, and thus spread the disease. The interior of the emptied hive, if it is worth preserving for future use, should be well singed with a wisp of burning straw and closed up to prevent bees from entering it; though the singeing alone is not sufficient to disinfect it. Time alone can do that effectually; and it should be well aired for at least two years before a colony is introduced, if we would be entirely secure against a recurrence of disease from the remains of the original infectious matter. It is by no means certain that sulphuring the hive, or washing it with a solution of chloride of lime, will thoroughly purify it, and these means should therefore not be confidently relied on. Even boiling an infected hive in a brewer's kettle proved insufficient, for after it was dried and restocked, the disease soon made its appearance again in the colony. No dependance can consequently be placed in such and similar processes. They may answer the end designed, in treating the mild kind of foulbrood; but when the disease is of the virulent and pestilential type, they will utterly fail. Here the only question is, what can be done to limit the injury to a minimum? The queen should be forthwith removed, as she can still be made to render valuable service, if young and fertile. But though the bees succeed in removing every perceptible trace of disease and impurity, before the young queen matures, it is idle to indulge the hope that the health of the colony has been thereby re-established. The malady will almost certainly reappear in its pristine malignant form, as the pestilential virus will probably have meantime been communicated to all the stores, and rendered impracticable the preparation of uninfected food for the larvæ. The new queen should, therefore, likewise be removed as soon as she has become fertile, and a sealed royal cell given to the colony some days after; or the bees should be driven out and treated as before directed, and the honey used for any suitable purpose except that of feeding therewith colonies which happen to be in need. Even expulsion and confinement do not always enable us to save the colony. We cannot safely give them combs with brood, lest the disease be at once communicated thereto; and the bees and queen are hence apt to abscond when again allowed to fly.—Taking into view all the difficulties and risks, I would advise the prompt and total destruction of the colony as soon as it is ascertained that the malady from which it is suffering, is *malignant* foulbrood.

As prevention is easier than cure, those who have occasion to feed their stocks, particularly in the spring, should be exceedingly careful as to the honey they use, and be certain that it is not derived from an infected source. If there is the slightest doubt respecting its quality or purity, it should in no case be used. Sugar candy, or dissolved brown sugar, should be employed in preference, as being both safer and cheaper, and quite as acceptible and serviceable to the bees.

[For the Bee Journal.]

BEE ITEMS FROM MAINE.

I see it frequently stated that 1860 was the poorest honey, or rather bee year for a long time past, throughout the whole world; but of this I can only judge from reports. Here in Maine, taking my starting point at 44° 46′ N., as far as I have been able to learn, it was full an average of years in the production of swarms and honey; but, trouble in the winter of 1860–61, began to show itself.

Some think the trouble arose from a fall harvest which the bees gathered from the alders—*Alnus serrulata*—which abound here, proving poisonous to them in the winter. An abundance of evergreens are accessible in almost every place; and after the summer drouth broke, the bees were very active till late in the fall, in their visits to these several kinds of trees, and especially so to the alders, after there had been frosts sufficiently severe to kill vegetation generally.

This spring, 1861, was an uncommonly wet, cold and backward one. Bees died to a fearful extent, both in the winter and till even May, and many stocks did but just enough survive to be able to mature brood after continued warm weather. The report generally was "honey enough" in the hives of those which perished.

The box hive is mostly in use, though there are many patent hives used, and many thrown aside as useless. Many traditional whims also are in vogue, like informing the bees of all the deaths, &c., &c., and dressing them in mourning.

The first swarm that I could learn of came out July 4th; but only a few, who had from one to five stocks, which lived, have had a single swarm, and those generally about the middle of July, or to be more exact, from the 10th to the 20th. Swarms were looked for as late as August 20th, but I do not know of any issuing so late. There are not half the number, probably, of stocks this fall that there were last.

The honey harvest, this season, is correspondingly small; so that, but a part of the July swarms will have enough to winter upon.

Elm Tree Farm, Maine. O. W. TRUE.

OCTOBER.

"But farmer, look, where full-eared sheaves of rye
Grow heavy on the tilth; that soil select
For apples; thence thy industry shall gain
Ten-fold reward; thy garners, thence with store
Surcharged, shall burst: thy press with purest juice
Shall flow, which, in revolving years, may try
Thy feeble feet, and bind thy flattering tongue."

☞ *Please send us the names of beekeepers.*

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Monthly Management.

OCTOBER.

If, from want of leisure or other cause, the union of stocks too weak to be wintered separately has been hitherto delayed, it can still be done on any fine mild day in this month. There will now be very little brood remaining in such colonies; and if placed in a cool and airy chamber, the surplus empty combs are not so liable to be injured by the moth and worms, as at an earlier period—though they should still be occasionally examined. If they be suspended in a close box, and exposed for an hour or two to the fume of burning brimstone, they will keep safely till the approach of spring: and renewed fumigation then will preserve them uninjured, till required for use when the bees are gathering honey or artificial colonies are to be made.

The more quiet the bees can now and henceforward during the winter be kept, the better; and they should, therefore, not be disturbed by feeding them, unless in the event of absolute necessity. When any colony is likely to be in need, honey should, if possible, be given them in sealed combs; and where liquid honey or dissolved sugar candy has to be fed, it should be placed within the hive in the evening, and the vessel removed early next morning. Give, on each occasion, as large a dose as the bees can carry up during the night, and repeat this till they have received an adequate supply. The earlier in the fall they are thus provisioned, the more properly will it be stored up in the combs, and the more likely is it that the bees will seal it up in the cells. If it can be conveniently placed, a portion, at least, of their supplies should be in the form of sticks or lumps of candy, because fluid food, given late, may remain unsealed in the cells, and is then apt to turn sour before spring and induce dysentery. Besides, where there is a large quantity of unsealed food, the temperature of the hive will be colder than is consistent with the comfort and health of the bees, and the confined air will become charged with an excess of moisture. If the bees are in a common hive, and have insufficient stores, the better way to supply them, is to cut a hole four inches square in the top of the hive, remove a portion of the comb, introduce a piece of thin coarse linen and place the sugar candy therein. Then invert a small tight box over the hole, covering and surrounding it with tow, or cotton waste, to prevent the escape of heat from the hive. An old-fashioned hive, containing a weak stock, may also be provisioned by inverting it, shortening the combs considerably, laying thin slats or bars across them and placing sticks of candy thereon. Tie a cloth over the mouth of the hive to keep the bees confined, and set it in its inverted condition in a warm place, till the candy has been carried down. This plan may be resorted to in the winter, to save a colony from starvation; but cannot be recommended for general purposes. If a comb containing sealed honey can be procured, and be laid on the shortened combs of the inverted hive, instead of the slats and candy, the bees will generally attach it securely in the course of the ensuing night; and the hive may then be turned up again and replaced on its stand.

It is, however, in all cases best not to winter colonies which are deficient in stores. Nothing short of absolute necessity can excuse it. Better break them up, uniting the bees with some other stock, and preserving the combs for future use. If given to an early swarm next season, more advantage will be derived from such comb, than from half a dozen poor starveling stocks which have required anxious attention for months, and may finally desert their hives in the spring.

Wasps are apt to become troublesome at this time, when the bees have retired to their winter quarters and left the entrance of the hives unguarded. If their visits are frequent, they carry off much honey and kill many bees. They should be killed wherever found, and numbers may be caught in vials half-filled with sugar water and suspended near the apiary. Mice should be excluded from the hives, by reducing the entrance so that only a few bees can leave or enter at a time.

☞Second swarms and weak first swarms cannot be induced to build drone combs; and where pieces of such are used as guide-comb, the bees, after constructing a few rows of intermediate cells, will build worker comb exclusively. But the case is otherwise if we give them drone-comb foundations to work upon, or drone comb from which the superstructure of cell-walls has been removed. On these, drone cells will be rebuilt. This shows that though bees, not intending to make preparations for swarming the same season when they are hived, will not construct the *foundations* of drone comb, they will nevertheless use them and build drone cells, if such foundations are furnished ready made.—Dönhoff.

☞As a supply for the winter, a strong stock should, on the first of November, contain at least one pound of honey for every thousand bees; and a weak stock should then have a pound and a half for every thousand bees.—Hofman.

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The Sexuality of Bees.

BY PROFESSOR LEUCKART, OF GIESSEN.

An animated and protracted controversy has subsisted, among apiarians and naturalists, respecting the sex of the three kinds or classes of bees which are consociated in the hive and constitute the community or colony. Until quite recently, the most divergent and conflicting views and opinions were advanced in the Bienenzeitung and other publications. This long controversy is now ended, and the warmly mooted question settled:—it being universally conceded that,

1. *The queen and the drones are the only individuals in which sexuality is perfectly developed:*

A, *the queen being of the female sex;*

B, *the drones being of the male sex.*

2. *The workers, in a sexual aspect, are imperfectly developed creatures: that is, imperfectly developed females.*

Had apiarians paid more attention to the results of scientific research in natural history, these conclusions would have been reached and become established at a much earlier period. Nearly two centuries ago (1672), the celebrated naturalist, Swammerdam, clearly demonstrated that the queen is a female, and that the drones are males—statements subsequently confirmed by numerous inquirers, among the later of whom I will mention only Prof. Von Siebold. Still, a knowledge of the true character of the workers is of later date. True, SWAMMERDAM already was aware that the workers are sexually undeveloped (he called them *natural eunuchs*); but he was rather inclined to regard them as stunted males, than as undeveloped females. If their essential femininity had been earlier recognized, the important and interesting truth promulgated by SCHIRACH (1767), that a queen could be reared from a worker larva, would not so long and so generally have been received with doubt and disbelief. The discovery of the real nature of the workers, for which we are indebted to the investigations and dissections made by Miss JURINE, in 1813, first furnished a key for a correct apprehension of that remarkable fact.

The masculinity of the drones was most generally and most pertinaciously doubted or denied by apiarians—many of whom have only recently yielded a reluctant assent. They regarded drones as anything but males. To the novice in natural science, it seemed utterly incredible that the male sex, which in the human race and the higher orders of animals holds the privileged and ruling rank, should in any case be sunk to so subordinate a condition as that occupied by the drones in the economy of the hive. The argument was plausible; for most apiarians were not aware that in many of the lower order of animals, the males sink to a position still more humble than that held by the drones among the bees.

There are not only numerous classes of creatures whose males, like the drones, make their appearance only at certain seasons, while the females live perhaps for years; but some also among which the males exist, simply for a brief term, to perpetuate the race. Thus among the Rotiferæ, the males are born, copulate and die—the entire absence alike of mouth and alimentary canal, rendering the reception and digestion of nutriment impossible, and limiting the duration of life to the briefest space of time. In other instances, as in that of the parasitic crab (*Lernaeadæ*), the female exceeds the male many thousand-fold in bulk; the latter living on the body of the former, and being so minute in size as to be

scarcely visible by the naked eye; whilst the former measures several inches in length.

Such facts as these divest of its singularity the apparent unnaturalness of the subordinate position occupied by the drone, when contrasted with the sexual relations subsisting in the higher orders of animal life.

The question respecting the sex of the several kinds of bees may be solved, either empirically, by observing their habits, or scientifically, by dissection and microscopic examination.

One empirical evidence of the feminine nature of the workers, is furnished by the fact already referred to, that a worker larva does, under certain conditions (as abundant supplies of food and enlargement of the cell), become a queen. And in like manner, the masculine nature of the drone is proven by the fact that, in the absence of drones, no queen becomes perfectly fertile. But this kind of proof is ever circumstantial, and leaves room for gross misconception and error. Thus, for instance, queens sometimes become fertile when drones are no longer seen; and it may hence be argued that these are not needed. But it is well known that they are occasionally tolerated in a hive, till late in autumn or even till mid-winter; and they are also sometimes found as early as in February and March. Hence, mistake and deception may easily occur; and it was invariably on such empirical evidence that some distinguished apiarians relied, when they strove to defend and maintain those singular and discordant views alluded to at the beginning of this article.

Under such circumstances, we can concede decisive force only to the direct investigations of the anatomist and the physiologist; and these have settled the question conclusively.

Nevertheless, the question which we are here treating is so important, of such fundamental significance, that the apiarian cannot be expected to yield assent to the mere *ipse dixit* of the physiologist. He must be placed in a position to scrutinize the particular anatomical facts on which the demonstrator bases his conclusions, that he may be able to form for himself an independent and intelligent judgment in the premises.

Let us see what the physiologist adduces in support of his views, or as the evidence on which he relies in making up his opinion.

1. The Drones are Males.

a. In the entire sphere of animated nature, it is the peculiar function of the male individual to secrete in his sexual organs, or in those genital glands known as the testes, a substance called semen or sperm, which exerts a fertilizing influence on the ova formed in the ovaries of the female. The secretion of this sperm is the most important as well as the most decisive characteristic of the male sex. Whenever, in any creature, we discover the secretion of sperm, we must, under all circumstances, regard it as being a male, however divergent and anomalous its organization may in other respects seem to be.

But what are the distinguishing characteristics of the sperm? To the ordinary observer, it seems to be only a viscid whitish or cream-colored fluid, whilst the naturalist, with the aid of the microscope, detects therein a countless multitude of living corpuscles which, despite of their minuteness, possess so peculiar a form that it is impossible to confound them with any other of the component portions of the animal body. Generally, these corpuscles are filamentous in shape; sometimes simple hairs; sometimes with a globular, cylindrical or ovoid head; yet always so characteristically formed, that though ignorant of their immediate origin, we can in many instances easily determine the animal, or at least the class of animals from which the sperm emanated. Superadded to this, is the circumstance that these filaments, in their fully developed generative condition, possess the power of voluntary and apparently independent locomotion, which is usually wanting in animal tissues, and which often so forcibly remind us of the movements of certain microscopic organisms, that for a long time they were regarded as such.

But it must not be supposed that these seminal corpuscles are found *ab initio*, and at all times in the seminal glands of male creatures. They become developed only at the age of puberty, and then only when the animal is *in heat;* though in an essentially corresponding manner in all animals. The testes of immature animals, and of such as are not in heat, contain, instead of the ultimate seminal corpuscles, a densely compacted mass of pellucid vesicles, which, at the approach of puberty, gradually enlarge, displaying internally a multitude of similar though secondary vesicles, which finally become developed as the characteristic seminal elements. Not unfrequently, the filaments of the original vesicles are observed still cohering in one mass for a considerable period, before the final separation takes place.

Precisely such corpuscles as here described originate also, and become developed in the manner stated, in the seminal glands of the drones. Like the seminal corpuscles of insects in general, they have an attenuate and simple filamentous shape, are of proportionably great length, with an active serpentine motion, so that the waving

of the aggregate mass resembles that of a grain-field influenced by a gentle breeze. Both Prof. Von Siebold and myself, while at Seebach in the summer of 1855, repeatedly exhibited to the Baron of Berlepsch and his beekeeper, these seminal filaments, under the microscope, as they were taken from the sexual organs of drones. Francis Hoffman, of Vienna, one of the few apiarians who can properly dissect and prepare subjects for the microscope, has likewise detected these seminal filaments, and furnished an accurate and interesting account of them for the Bienenzeitung.

But in the drone, the development of these seminal filaments takes place only once in the life of the insect, and this at the latter period of its existence as a *pupa*. When the drone emerges from his cell, the seminal elements have already been transformed into mobile and fruct[redacted]ing filaments, which gradually leave the testes and collocate, in larger masses, in distinct portions of the seminal ducts, the so-called seminal vesicles, in readiness for transmission into the female sexual organs.

We thus perceive why the testes of mature drones appear so diminutive and shrunken, in comparison with the ovaries of the queen. After the egress of the seminal filaments, the testes gradually shrink up and assume the appearance of two flat reniform bodies, which are found above the intestines and immediately beneath the exterior integuments of the abdomen, and are composed of a membranous tissue permeated by numerous air vessels.

If we would examine the testes of the drone in their amplest development, we must take the insect, as already remarked, in the later period of its pupa state. According to my observations, they present, at this stage, the appearance of a pair of bean-shaped bodies of considerable magnitude, meeting above the intestines along the central line of the back, and consist, like the ovaries of the queen (which they nearly equal in size), of numerous minute tubes (*fig.* 1, a) which radiate from the upper ends of the two branches of the seminal duct, and are in each compacted in a dense mass. Of such tubes, I counted from 200 to 230 in each of these bean-shaped bodies; each containing, according to the period of examination, either innumerable mobile filaments, or fully developed vesicles.

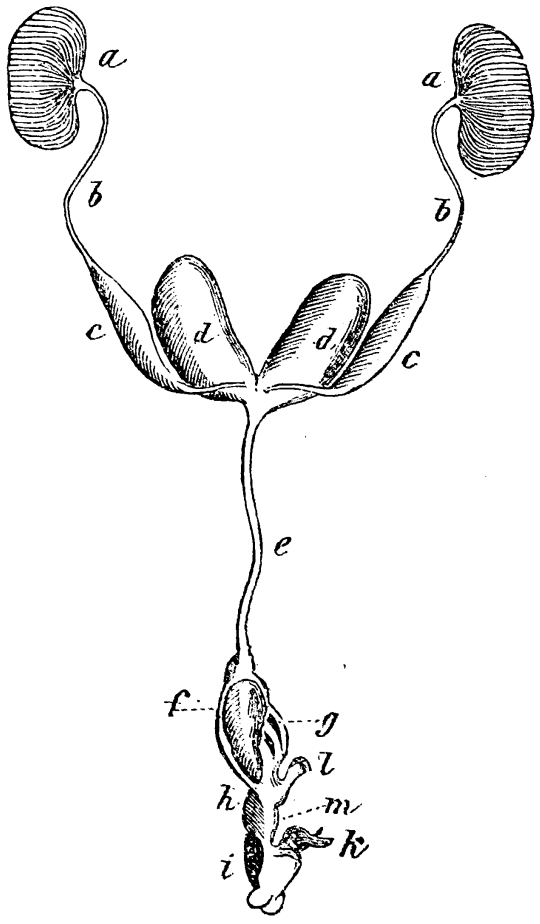
b. But it is not merely by the presence or development of the seminal filaments, that the masculinity of the drones is indicated. The anatomical structure of the entire sexual apparatus renders this so obvious, that the older naturalists (Swammerdam, Reaumur and others), though ignorant of the existence of the seminal filaments, could not for an instant doubt the masculine character of these creatures. As in man and the higher order of animals in general, so in insects also, the development of the sexual organs presents certain characteristic traits most distinctly indicating their male or female nature.

But before describing these specific peculiarities, I may state that the sexual organs of the bees, like those of insects in general, correspond in the males and females, in the correlation of the parts. In both cases (*compare figs.* 1 *and* 2,) we find, in connection with the sexual glands which are situated over the intestines, a Y-shaped duct, the stem of which terminates in a point of the abdomen immediately under the anal orifice, whilst the branches beyond the bifurcation embrace the sides of the digestive organs, extending upward to connect with sexual glands above mentioned.

Yet, notwithstanding this analogous arrangement, the male and the female organs differ characteristically from each other.

As characteristic of the male organs must primarily be regarded the presence of a penis, designed to enter the female organs in coition and transmit the semen. Yet we must not conceive of it as a special tissue, distinct and separate from the other sexual organs. In insects, the penis is nothing more than the terminal section of the stem of the oviduct, fitted for its special function by the development of corneous adjuncts exceedingly diversified in form and structure. To it, in male insects, are very generally appended a pair of tubular glands, which unite with the main stem of the duct near the point of bifurcation, and were formerly regarded as seminal vesicles. These appended glands contain a milky secretion, which envelopes and cements the seminal filaments into distinct masses or spermatophores, in which form they enter the female receptacle during coition.

Fig. 1.



If we now examine illustration, *fig.* 1, (which I flatter myself is an accurate representation of the sexual apparatus of the drone), we shall find all the characteristics of masculinity which we have thus endeavored to specify. In *d*, we have the two appendicular glands, which in the bee are peculiarly short and compact. These terminate in the upper end of the main stem of the oviduct *e*, whilst the lower portion of this duct (from *f* onward) is converted into a penis. The two branches of the duct, *b b*, above the bifurcation, present a cylindrical enlargement of the lower half of each, *c c*, in which the semen, after leaving the testes, *a a*, is retained for a season before descending still further to the incipient section of the penis, where, in combination with the secreted matter derived from the appendicular glands, it forms a so-called spermatophore—one of which is exhibited in the cut at *f*, being a pear-shaped body distending the upper portion of the penis in a bulbous manner.

If, as indeed would seem most natural, we should include under the term penis all that portion of the sexual apparatus immediately concerned in copulation, we can still only apply the term in the sense above indicated. Thus, the penis of the drone is a cylindrical tube or duct coated internally with various corneous tissues, being itself simply a continuation, or more accurately, an integral part of the main duct peculiarly developed. In copulation, this tubular penis becomes inverted, like the fingers of a glove turned inside out, and when in that state, appears like an external appendage of the sexual orifice—the previously internal surface, with its corneous tissue, having now become the exterior. Prof. Von Siebold uses the term penis in a different sense, and applies it only to a portion of the corneous tissue of the internal surface.

If the penis of the drone were simply a cylindrical tube, it would in its inverted state present an appearance similar to what is seen in a prolapse of the rectum, in which the inverted portion of the intestine forms a sheath enveloping another portion, unnaturally protruded indeed, but not yet exposed. The terminal orifice of this sheath is the entrance to the yet enclosed portion of the intestine, which, as the protrusion advances, is inverted and becomes itself the sheath. Like the original anal orifice—to adhere to our illustration—the terminal orifice represents in fact a cross section of the rectum, now indeed no longer coincident with the end of the intestine, but with a line originally lying higher up within the body. The further the prolapse extrudes, the longer does the sheath thus become, and the further removed will the virtual cross section be from the true end of the intestine, really receding higher up.

The relations of the inverted penis correspond essentially with those of the illustration taken from a not unfrequent disease. By pressure on the abdomen of the drone, directed towards its apex, we can perceive how the penis becomes gradually more and more inverted and turned into a sheath, which, when the inversion is completed, encloses the upper, thinner, and yet unextruded portion of the stem of the oviduct. At first, this inversion is limited to that portion of the penis situated nearest to the sexual orifice—that is, to the terminal part. But by continued pressure, the inversion progresses, extending more and more to the anterior portions, and finally the whole organ is turned inside out and prolapsed. Now, whether the penis be wholly or only in part inverted, it still exhibits, at the virtual cross section, a passage communicating with the yet uninverted portion, and thence with that portion of the seminal duct which never becomes inverted or protruded. Mr. Kleine is of opinion that the penis of the drone is an independent tissue, the interior of which is distinct and separate from the oviduct; but by means of the microscope, the connection and continuity of the passage can be distinctly seen. The position of the spermatophore also proves this connection and continuity, for it does not correspond with the end of the oviduct, but with the anterior portion of the penis.

If, at first view, the relations of the parts appear to be somewhat complicated in the case of the drone, this results from the fact that the penis is not simply a cylindrical tube, like the prolapsed rectum, but an articulated structure variously developed in its several parts.

It will, I conceive, be most convenient to subdivide the penis into three sections, the terminal, the middle, and the upper or bulb. The first mentioned, is that which first presents itself in the process of inversion, and with the exposure of the last the process is completed.

The terminal section, easily recognized in fig. 1, is the widest. In its natural position, it appears as a nearly globular or drum-shaped tissue communicating with the sexual orifice, and having two pretty large brownish spots on opposite sides, corresponding with the ventral and the dorsal region. Under the microscope, we discern that the spot on the inner ventral surface is composed of a fringe of stiff brownish hairs turned towards the rear, which of course point in the opposite direction when, by inversion, the inner surface is turned outward. They consequently rise and oppose the retraction of the organ from the sheath of the vagina after copulation.

The coloring of the dorsal spot does not result from a hairy fringe, but from a peculiar scaly corrugation pertaining likewise to the inner surface, and which, when inverted, increases the number and extent of the points of resistance presented to the retraction of the penis. Close to this dorsal spot, and near the terminal section of the penis, two tapering brownish cul-de-sacs (fig. 1, *k*,) rise, which are likewise turned inside out in copulation, and constitute the two well known curved horns that give to the sexual apparatus of the drone its singular appearance. (In *fig.* 2, which represents a partially inverted penis, only one of these horns is shown—the other being omitted to simplify the representation.) The yellow color of the horns results from an arrangement of scales similar to that noticed on the dorsal spot.

Next above the terminal section of the penis, is a distinctly defined narrower part—the middle section—which, on continued pressure, extrudes between the two just mentioned horns, and resembles a slender spine curved slightly upward. On the dorsal and ventral sides of this middle piece, are also seen two remarkable brownish spots. The latter of these consists of five or six consecutive obliquely curved lines; and the former, placed far back, where the middle piece is divided from the terminal section by a deep constriction, resembles a horseshoe in shape. These spots result in each case from a dense fringe of bristly hairs, more minute than those on the inner ventral surface of the terminal section, and the remarks made with reference to them, apply to these likewise.

A further characteristic of the middle section, is a minute mace-shaped *cul-de-sac* (*fig.* 1, *l*,) projecting from the dorsal region of its upper and somewhat thicker part; and which likewise becomes protruded, when the middle section is inverted. Previous thereto, and while remaining in a state of repose, the margin of this *cul-de-sac* is variously folded and corrugated.

As respects the upper section or bulb of the penis, it appears when empty (that is, in the absence of a spermatophore,) like a pear or heart-shaped tumor, enclosed on its dorsal side by a brace of horny scales. The presence of a spermatophore (*fig.* 1, *f*,) modifies the form of this bulb in several respects, yet only during its continuance therein, as the bulb immediately resumes its original shape after the discharge of the spermatophore.

At first view, it would seem as if there were four of those horny scales already mentioned. But on closer examination, it will be found that there are really only two. The deceptive appearance is produced by the fact that the inner sharply defined edge of both scales, is rendered more conspicuous than the rest of the surface, by its higher coloring and the direction of its cusps, and are hence readily taken to be distinct objects. The cusps are detached from the side walls embraced by the scales, and extend freely into the cavity of the bulb. After the inversion of the penis, they resemble two short prongs, curved towards the head of the drone, and like the bristly hairs of the other sections, serve to retard the retraction of the penis. The same is true also of the lateral portions of the horny scales, their posterior edges having various prominently developed projections.

This singular structure and conformation of the parts, makes it manifest that the union of the drone and queen in copulation, must be such as involves a disruption of the penis on separation.

The force which effects the inversion of the penis is very simple. It consists of the pressure which the drone, by a violent constriction of the muscles of the abdomen, exerts on the sexual apparatus which lies loosely in the cavity of the belly—being connected with the body only at the rim of the sexual orifice. Fancy the finger of a glove partly inverted. If the upper portion be now inflated with air and then compressed, the point of the finger will be gradually forced out and also become inverted. The operation is almost precisely similar in the case of the drone. The side walls of the abdomen represent a sac which is filled with blood and intestines, while its margins are recurved and continued inward, constituting the sexual organs of the drone. As soon as the sides of the abdomen contract by the action of the muscles, the penis is projected and inverted —first presenting simply the terminal section, then the middle portion, and finally the bulb—thus liberating and discharging the included spermatophore. The more completely the abdomen is filled and distended, the more readily and perfectly will the sexual apparatus be thrown forth inverted. Now, among the internal organs of the drone, there are some which can become inflated only under certain conditions. Such are the tracheæ, which permeate the body as ramified tubes, with occasional enlargements or sacs of variable dimensions. The most of these, while in a state of repose, are collapsed and nearly empty; but they become somewhat charged with air while the insect is preparing to fly, and are only fully inflated when it is on the wing. The inflation of these tracheal tubes, presupposing the simultaneous closing of the spiracles, must very considerably increase the pressure exerted on the side

walls of the abdomen; and this enables us to perceive the reason for the remarkable fact that copulation is effected exclusively while the parties are flying. In a state of comparative repose, when the tracheal vessels are collapsed, the amount of pressure which the drone could exert on the contents of the abdomen, would not suffice to effect that perfect inversion of the copulating organs, which is indispensable to liberate the spermatophore and introduce it in the vaginal sheath of the queen.

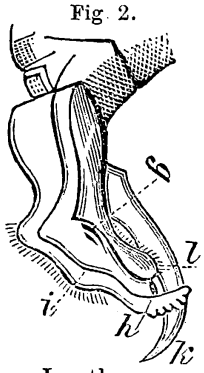
It has indeed been urged as an objection to this view of the matter, that if the head of a drone be cut off when he is in a condition of repose, the genital organs will still be thrust forth inverted. The fact is true, and may easily be physiologically explained. The decapitation violently affects the nervous system, and this superinduces an instantaneous convulsive constriction of the abdomen, followed by the extrusion and inversion of the genital organs. But this inversion is by no means complete, but invariably—so far as my observations extend—partial only. The terminal section of the penis only with its horns, is thereby extruded; or with it at most, only occasionally also, a portion of the middle section; whilst the bulb always remains unmoved and unaffected. When this latter, likewise, is to be extruded, and the spermatophore liberated and discharged, those physically favorable conditions are indispensable, which can occur only, in adequate force, during the flight of the insect.

Moreover, we are not to imagine that the drone, when about to copulate, voluntarily extrudes the organ. The process is decidedly otherwise, as is manifest from the fact that the organ, with its various and irregular adjuncts, could not possibly thus enter the vagina, however widely distended this might be. Obviously, inversion and insertion are simultaneous. Doubtless, the terminal point of the abdomen is inserted in the sheath of the vagina, before the extrusion and inversion occur —thus affording the successively inverted parts time to assume their proper relative position within the cavity of the vagina.

The inverted organ, besides, is of very considerable volume; much greater, indeed, than in its unextruded state. This results from its being then engorged with the blood circulating in the vessels of the abdomen, whereby its cavernous tissues, previously collapsed, have become filled, and as it were inflated. This engorgement produces a certain degree of expansion and rigidity. Where, in the collapsed state of the vessels, softness and flaccidity are seen, turgescence is more or less conspicuous after inversion.

But I should become tedious, were I to describe in detail the form of the inverted organ, with all its peculiarities. I must therefore content myself with referring the reader to the annexed cut, which is a representation of the extruded and inverted penis, and in which the corresponding parts are designated by the same letters as in *fig.* 1. The more important and more remarkable features of the inverted organ have, besides, been already sufficiently adverted to in the course of the preceding statements.

Fig. 2.



In the process of inversion, moreover, the internal portions of the organ would obviously undergo no inconsiderable distortion, if this had not been specially provided for in the organization of the drone. The seminal duct, for instance, which would be most directly affected, is distinguished not only by great length and convolution, admitting of considerable displacement, but is, in addition, so exceedingly elastic that it may be stretched to more than twice its ordinary length. The disruption of the sexual organs involves also the severing of this duct, sometimes in its upper part, sometimes in the lower. In the former case, the fragment adhering to the disrupted sexual organs appears as a filament, or "white thread," depending from the vagina of the queen, and is regarded as evidence of accomplished copulation.

c. What has here been stated respecting the sex of the drones, is true not only of those which are reared in drone cells from the eggs of a fecundated queen, but of all drones without distinction. Those originating from the eggs of unfecundated or drone-producing queens are, as I have ascertained, as perfectly developed and as fully virile as others. So are likewise those dwarf or diminutive drones, which are occasionally bred in worker cells. Nay, even in a drone hatched in a royal cell, though prematurely dead, sent to me by Mr. Kleine, I have unquestionably found seminal filaments and male organs. The case is precisely similar also with drones hatched from eggs laid by fertile workers. Mr. Vogel inserted in a hive of common bees, a drone-comb containing eggs laid by an Italian worker (which he had seen laying in a queenless stock), and removed the colony to an isolated locality. Italian drones were hatched, and two common queens, fecundated while these drones were flying, producing partly common and partly Italian workers. As there were then no other Italian drones in that neighborhood, those queens must have been fertilized by drones produced from the eggs of the fertile worker. That

this is possible, has been shown by the explicit and direct investigations of Prof. Von Siebold. During his sojourn at Seebach, he found in the sexual organs of such drones, the usual moving seminal filaments; and I made the same observation myself in several individuals sent to me for dissection, by Dr. Dönhoff.

2. *The queen bee is a female, and moreover the only perfect female in the colony.*

The evidence of the feminine nature of the queen bee can be much more easily furnished, than that of the masculinity of the drone. The *eggs* which, instead of seminal filaments, are found in the sexual organs of the queen, are well known to most apiarians; and the production of young from those eggs, preclude all possibility of mistake. Moreover, numbers of observant beekeepers have repeatedly seen queens lay eggs in worker and also in drone cells, from which eggs, workers and drones respectively in due time emerged. Hence, this point is placed beyond doubt or cavil, by the ascertained facts of the case.

Dissection, too, furnishes results entirely coincident with those supplied by observation. Beneath the dorsal integuments of the queen, and in the position occupied by the two testes in the drone, we find a pair of heart-shaped bodies, of considerable size, which occupy a large portion of the cavity of the abdomen, and are, like the testes, composed of a great number of minute tubes—from 160 to 180—bound together by enveloping air vessels (*fig.* 3, *a*). The bodies thus composed, are the *ovaries*. At the season of most abundant pasturage, each of the constituent ovarian tubes contains, in its lower part, one or more mature eggs, with perhaps a dozen more, in a less developed state, following them; so that we may safely estimate the entire number of eggs and egg-germs contained at one time, in the two ovaries, at not less than 4000. The case is different during the period of winter repose—when the number of egg-germs is reduced, according to my own observations, to one-half of that number, or perhaps less; and mature eggs are *then* rarely found.

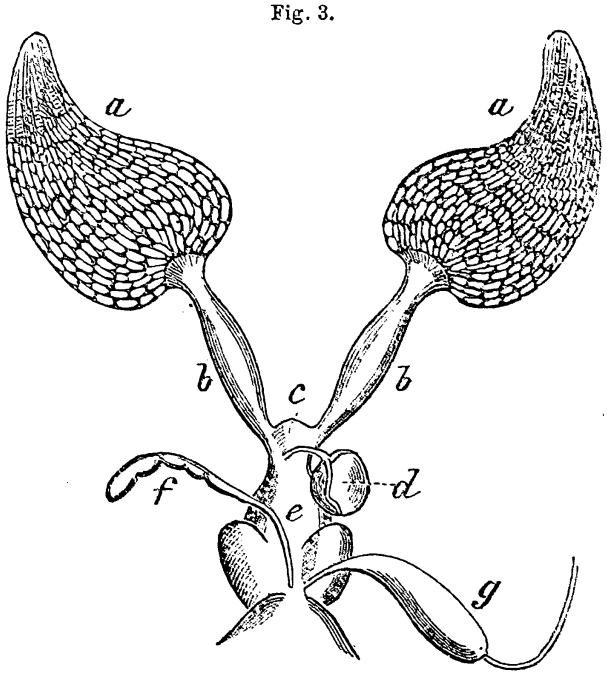
The incipient formation of these egg-germs occurs at a later stage in queens, than the development of the seminal filaments in drones. In royal pupæ nearly ready to emerge, such as I have frequently dissected, no egg-germs were present. In them, the contents of the ovarian tubes consisted of minute pellucid globules, precisely similar to the globules which precede the appearance of seminal filaments in the testes of the drones. The ovarian tubes in these immature queens were then also shorter and thinner than subsequently; and the development of the ovarian tubes was always correspondent to the egg-germs they contained.

The primary germs of the eggs invariably originate in the pointed upper ends of the tubes. There, a number of larger and more pellucid globules arise, which arrange themselves consecutively within the tube, each surrounded by a sort of halo, which is continually enlarging and becoming more opaque the further the globule descends in the tube. Out of this halo, the yolk is gradually educed, which, when it reaches the lower part of the tube, has also received a denser exterior envelope, the *chorion*, and therewith the formation of the egg terminates.

As soon as the egg-germs attain an appreciable size, they occasion a corresponding enlargement of that part of the ovarian tube in which they are situated. The globules also which happen to be placed between any two egg-germs, gradually increase in size, causing a similar enlargement of the ovarian tubes; so that these, in the case of fertile queens, finally somewhat resemble strings of minute irregular sized pearls. Still, we must not suppose that each enlargement of the tube is caused by an egg-germ or an egg—only each alternate one being thus produced.

b. As the masculinity of the drones is shown not solely by the contents of the germ-glands, but likewise by the structure of the ducts, so in like manner is the femininity of the queen manifested. The queen exhibits in these respects exactly the same relations which are seen in general in all female insects. These present a vagina near the termination of the excreting duct, and higher up within the dorsal covering, a small petiolated sac or spermatheca, designed to receive and retain the seminal matter derived from the male, and discharge it on the eggs successively passing its mouth in descending the oviduct.

Fig. 3.



In *fig.* 3, which represents the sexual organs of the queen bee, the vagina is designated by *e*, and the spermatheca by *d*. In *b b*, we have the bilateral oviducts, corresponding with the two seminal ducts of the drone; and in *c*, the short pear-shaped stem of the main duct—passages which, apart from other peculiarities, differ from the analogous parts of the male by their enlarged calibre, adapting them to the size and diameter of the egg.

The *vagina* (*e*), imperfectly recognized by earlier observers, is a large and capacious conical body, the posterior portion of which is developed into two ovoid lateral pouches, which I am inclined to think are designed to receive the already described horns (*fig.* 2, *k*), so prominent and conspicuous when the sexual apparatus of the drone is extruded and inverted. Still, I am not prepared to speak positively as to the relative purposes subserved by the several parts of the copulating organs, as I have hitherto not had an opportunity to dissect a queen retaining the disrupted penis.

The spermatheca (*fig.* 3, *d*), laterally connected with the neck of the vagina, is in the queen bee of unusual magnitude, so as to be readily seen even by the unaided eye. It is large enough to contain, according to my computation, probably twenty-five millions of seminal filaments.

Swammerdam, who notices and minutely describes this organ, regarded it as a gland secreting the glutinous matter which covers the eggs and attaches them to the bottom of the cell when laid; and he appears to have remained ignorant of its significance and importance. It was reserved for a French naturalist, M. Audouin, to discover its true character as a spermatheca, and thus furnish the clue for an intelligent explanation of the fact first observed by Janscha, that a single impregnation sufficed to render the queen bee fertile for life. This discovery has been fully confirmed by the investigations of later naturalists, and may easily be verified by means of the microscope, when a fecundated queen is dissected. In the virgin condition of the insect, the spermatheca contains a transparent liquid, in which no seminal filaments can be discovered.

The surface of the spermatheca is covered with a reticulated tissue of air vessels, giving it a considerable degree of elasticity and also preventing it from collapsing. But we find likewise within the coats of the spermatheca, a delicate muscular tissue, by the contraction of which, compression is effected and the contents forced out through the discharge pipe into the oviduct. The surface of this discharge pipe also shows a series of annular muscular fibres, particularly near its upper end, where they cause a decided enlargement of its diameter. Near the point of its connection with the spermatheca, two other glandular ducts, irregularly distributed over the surface of the latter, are inserted.

The vaginal orifice appears like a transverse incision across the apex of terminal wing of the abdomen, extending nearly to its anterior edge, and dividing it into two scoop-shaped parts, the interior surfaces of which, are a continuation of the external integument. As these parts are movable and turn on the anterior edge like a door on its hinges, it follows that the vaginal orifice may at times seem a narrow slit, and at others a widely gaping opening.

The *sting*, with its appendages, is situated above the vagina and between it and the excretory duct, and may be regarded as the terminal point of the abdomen, though it is not usually exposed to view, but remains retracted within its sheath. I do not propose to give a special description of this apparatus, merely remarking that such is found only in female insects; and its presence in the queen bee, may therefore be considered as an additional evidence of her femininity. It serves her, and other insects similarly provided, as a weapon of defence, being connected with a gland furnishing a highly acrid secretion, which is injected into the wound through a channel in the sting. In the queen, this gland is constituted of two long filaments, which extend in numerous convolutions between the vagina and the rectum, ultimately uniting and discharging their contents into a retort-like sac—the poison bag (*fig.* 3, *g*), the neck of which is furnished with several powerful muscles, and is inserted between the vagina and the sting-apparatus, or rather in the base of the latter. We find there also another hose-like appendage, first described by Von Siebold (*fig.* 3, *f*), which secretes an odorous unctuous fluid. Von Siebold was of opinion that this fluid is the glutinous matter which covers the eggs, and by which these are attached to the base of the cell. But as, according to my observations, the mature eggs are supplied with this glutinous matter while yet in the oviduct, this organ must have some other function. I incline to think that the oily secretion is designed to lubricate the sides of the barbed piercers, which rub longitudinally against each other when the sting is brought into action. I find some confirmation of this conjecture in the fact that when stung in the face, we always perceive a peculiar odor resembling that of this secretion; which warrants the inference that a more abundant effusion of it attends the act of stinging.

But it would seem also that the use of the sting is not restricted to purposes of attack or defence. It appears to serve the same purpose likewise in ovipositing. Undoubtedly, according to the observations of Dönhoff and Berlepsch, it is not then protruded; but we may, nevertheless, reasonably suppose that it exerts some influence on the placing of the egg, even though that be confined to giving it the proper direction as it glides along its curved and concave surface.

Some apiarians speak also of an *ovipositor;* but that which discharges the functions of an ovipositor in other female insects is, in the queen bee, developed as the sting-apparatus. She possesses no other ovipositor, and the sting-apparatus is scarcely entitled to be so designated. Others, again, have so named the conically protruded rectum, seen when the abdomen is forcibly compressed. This is obviously a *misnomer.*

b. That the queen is the *only* perfect female in the hive, is evident from the fact that after she is removed, there is *never* any egg laid from which a worker or a queen can be reared. Though, in a queenless colony, eggs be sooner or later laid by a fertile worker, these produce drones *only.* Hence, as the queen *alone* can procreate the three different kinds of bees—workers, queens and drones, it necessarily follows that she is the only perfect female in the colony.

c. In exceedingly rare instances, in spring, autumn and winter, two fertile queens are sometimes found in a hive. This happens when a superannuated queen is about to be discarded, yet chances to survive till her successor has been hatched and fecundated, while she continues to enjoy the attachment and fealty of some portion of her old adherents. It may also occur when, on uniting colonies in the fall, two queens are introduced, each of which is for a time protected by her own subjects. Once, indeed, the Baron of Berlepsch, as he informed me, found two highly fertile queens in one hive, in July; but the one had taken up her quarters on the brooding combs, and the other was ensconced in the honey chamber —though the workers made use of one common entrance. This case, however, is not particularly striking or important, because the original queen may have accidentally found her way into the honey chamber through a narrow passage, and was then unable to return; while the bees below, missing her and supposing her to be lost, proceeded to rear another. As the two never came in contact with each other, both were permitted to live.

3. *The workers are undeveloped females.*

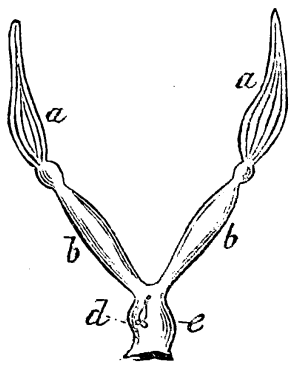
a. The femininity of the workers manifest from the structure of the sexual organs. No trace of a penis, such as we have seen is characteristic of the males, is to be found; but instead thereof, we have the transverse incision of the terminal abdominal ring, differing only in size from that of the vaginal orifice of the queen. In the cavity of the abdomen also, immediately adjacent to this transverse incision, we find the sting-apparatus situated just as in the queen; and this not in one or two individuals only, but in each and all, without exception. Workers destitute of sting—save from accident—have never yet been observed; and the sting alone is decisive as to their sex.

Yet it cannot be denied that the sting-apparatus of the workers differs, in many respects, from that of the queen. But these differences are still of a very subordinate character. They relate almost exclusively to size and form. The sting of the queen is curved downward, obviously, as was stated before, to give the extruded egg its proper direction; but in the workers, which employ it exclusively as a weapon, it is straight, and is thus, as well as from the number of barbs with which its piercers are furnished, better adapted to discharge its appropriate function.

The poison-bag and the lubricating gland, which, according to my examination of the workers, are situated in them just as in the queen, are however considerably smaller, and the glandular filament is single, in its entire length.

b. Though the workers, in the peculiar structure of the sexual organs, possess the most unmistakeable attributes of the female sex, they are, nevertheless, decidedly distinguished from the queen by being, at least for the most part, barren or sterile. But this circumstance is easily explained, when we examine the structure of the interior sexual organs. The proper anatomical preparation of these organs of the workers, is an exceedingly difficult task, and this led the elder naturalists, Swammerdam and Reaumur, to regard them as totally wanting. But since the results of the investigations made by Miss Jurine and Dr. Ratzeburg have become known, the erroneousness of those views has been acknowledged. We now know not only that such internal sexual organs exist, but also that, in their main typical features, they conform to the structure of those of the queen.

Fig. 4.



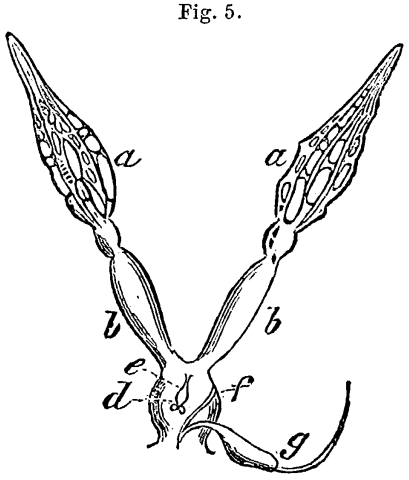
On a comparison of fig. 4 with fig. 3, which presents internal sexual organs of the queen, the resemblance will become sufficiently obvious. In *a* (*fig.* 4), we have the ovaries of the worker; in *b*, the two corresponding oviducts; in *e*, the vagina, with the stem of the main

oviduct; and in *d*, we even recognize the spermatheca, in its rudiments. But all these various organs are not only much smaller, but those parts precisely which are of most importance in the sexual functions of the queen, are here in the highest degree shrunken and stunted. The ovaries consist of only a few slender tubes, varying in number from two to twelve, and in their ordinary state contain no eggs or egg-germs. They are simply narrow canals, the contents of which, as in a queen before fecundation, consist of minute pale globules; and the cross section of the ovaries is scarcely larger than that of the bilateral oviducts. So likewise the vagina is only a small, though still comparatively capacious organ, lacking the lateral pouches, and scarcely distinguishable from the stem of the main oviduct situated immediately above. It is wholly impossible that the male genitals, if they could pass its external orifice, should find room in the vagina.

The spermatheca, too, is exceedingly minute, merely rudimental, and entirely incapable of receiving the spermatophore. Scarcely visible by the naked eye, it appears generally, according to my observations, as a mere analogue of the seminal duct. The sac itself is almost wholly obliterated, and the rudimentary remains of the glandular appendages are inserted in its slightly bulbous end, as they are in the queen, in the muscular bulb of the oviduct.

The difficulties above referred to as attending the anatomical preparation of these organs, do not result merely from the minuteness and delicate structure of the several parts, but from their connection with numerous air-vessels. In the pupa state, when these air-vessels have not yet attained their full development, and even in the earlier part of the subsequent period, the preparation is more easily accomplished; and the relative size of the parts seems then, too, to be considerably greater. I must doubt, however, whether, as I formerly supposed, a gradual shrinking takes place with advancing age. Certainly, after I had attained greater proficiency in preparing these organs, I seldom failed to detect them even in the oldest and most shrunken specimens.

Fig. 5.



c. In certain contingencies, some individuals among the workers acquire the capacity to lay eggs. Fig. 5 presents a view of the genitalia of such a bee. We readily perceive that a fertile worker differs from her sterile sister, merely in the more advanced development of the ovaries (*a a*). Yet the difference is not greater than that which is found between the ovaries of a recently hatched and a mature egg-laying queen. It results entirely from the development of egg-germs and eggs in the individual ovarian tubes—which proceeds precisely in the manner described in the case of the queen. The ovarian tubes then assume the appearance of a string of pearls, and become somewhat elongated—though never attaining the length of those of the queen. Nor are there ever, even under the most propitious auspices, half as many egg-germs found in an ovarian tube of a worker, as in one of those of a fecundated queen. Generally, the tubes are very irregularly and imperfectly furnished with eggs. Some individuals, indeed, are found in which only a few of the tubes exhibit such contents, and then only at isolated points—which sufficiently accounts for the fact that a fertile worker deposites her eggs in a much more irregular manner than a queen.

"INSTINCTIVE INTELLIGENCE."

This term has been employed by Coleridge ("Aids to Reflection," page 181,) to the nature of the Bee and other insects, in consequence of the *power* displayed by them "of adopting the proper means to proximate ends according to varying circumstances;" and his inference is drawn more especially from their devices employed in the construction of their dwellings. This definition of *intelligence* does not, however, appear to us sufficiently clear; unless Coleridge attributed that quality to the Hermit Crab and to numerous other creatures that have the power either to appropriate objects ready formed as dwellings, or to construct them from various materials, according to circumstances, but which rank very low in the animal scale.—Availing ourselves of the "aids to reflection" afforded by the latest and most eminent psychologists, we conclude that before such actions as those referred to by Coleridge, *apparently indicative* of intelligence, can be considered as truly so, it must be shown that the creatures are *conscious* that they are applying the proper means to the proximate ends. The line of demarcation is, however, exceedingly faint and difficult to distinguish; and Coleridge's reflections on the subject, beautiful though they be, are unfortunately not calculated to render it more easily definable.—SAMUELSON.

[For the Bee Journal.]

Kirby's Theory vs. Langstroth's.

The Rev. L. L. Langstroth, in his article in the Bee Journal, page 204, says, after a careful examination of my theory, he is unable to see any proof in support of it. I will endeavor to contrast his theory with mine, knowing that the theory which comes nearest to the law given by the Author of Nature to the honey bees, to govern them in their reproduction—which also controls them in all their varied instincts to preserve life, and causes them to lay up stores for themselves and man—the theory which comes nearest to the laws of nature, we must admit is nearest right. The Author of Nature has made but one general law for the reproduction of the animal and vegetable kingdom, which is that of male and female, in which the pollen or seed of each must be brought in contact with each other, in reproduction, and by that means alone. The Rev. L. L. Langstroth, in his work on the Honey Bee (which I consider one of the best works extant), gives his theory as follows:—The virgin queen, whilst a virgin, produces only drones. The queen is produced from the worker larvæ, and impregnated or made prolific by highly concentrated food secreted from honey, bee bread and water (*see page* 64). According to his theory, both the drone and the queen are produced contrary to the laws of nature. I intend to keep within that law, and to give it full force. My theory is that, to produce the three sexes, there must be three distinct infusions of the semen. First, to impregnate the ovary to produce the *drone;* second, the queen infuses the egg from her spermatheca to produce *workers;* third, the workers infuse the worker larvæ in the royal cells and the ovary of the young queen, *while yet in the cell*, with the semen of the drone. Her eggs, when she leaves the cell, will produce only drones, without further fertilization. In Huber's time, he believed the jelly so called, was of such fertilizing power as to cause the ovaries of the workers to become prolific. Dzierzon also believed that the fertile worker's eggs had in some way been impregnated, to cause them to produce drones only. As it is proved by Dr. Dönhoff, that it is the animal secretion found in the queen's cell that effects the physical change from a worker to a queen, I do not doubt that this goes far to substantiate my theory.

The reason why the queens mentioned by L. L. L. lay only drone eggs, or but few, is because the instincts of nature are not fully complied with, in not being fecundated by the drone, to enable her to lay eggs which will produce workers. This is a fact that the Rev. L. L. Langstroth very well knows, although he attempts to mystify it in his article against my theory. On the first publication in the Rural New Yorker of my theory, it was believed by many that it was impossible for the semen to retain its vitality in the combs, from the time the drones were destroyed until they made their appearance the following season. But now it is put to rest, if confidence can be placed in Mr. Hoffman's experiments, as given in the Bee Journal, page 213, showing that the spermatozoa, or the life part of the drone sperm, which is the same, after being a long time in water, or when taken from recently killed queens, or when moistened after having been a long time dry, would exhibit signs of life, confirming my theory. For, it is evident that it can be placed in the combs, and for a long time without destroying its vitality. The Author of Nature has evidently designed the tenacity of life of the semen of the drone after being given off, for the reproduction of a part of their race, it is well understood how the *worker* is produced. We must, therefore, look to the queen and drone to solve whatever of mystery still remains. I think the theory of the Rev. L. L. L. about the virgin queen's producing the drone, is in direct opposition to the law of God. When we see the reproduction of the queen and drone as the Author of Nature designed it, the mystery will be solved, and the Rev. L. L. Langstroth saved, in future, all trouble of *conscience* in giving a reason for the *number* of drones and the reproduction of artificial queens, in that he felt it his duty to caution his readers against infidelity, for his theory seeming not to be in accordance with the laws of God. See his third edition, pages 53 and 68.

Now, I will take up his theory of *Jelly*, or highly concentrated food, by which the worker-larva is impregnated, and the queen made prolific as far as *drones* are concerned. Would he not do well to caution his readers against infidelity on that point? I will take the analysis of the Jelly by Dr. Dönhoff, as given in the Bee Journal, see page 36, as proof of my position, that Jelly is "animal secretion," instead of vegetable (as declared by L. L. L. on the Honey Bee), and should be designated by some more appropriate name; since Jelly is never found in the stomach of the bee, showing that the Rev. L. L. L.'s theory, that *vegetable Jelly* changes the physiology from a worker-larva to that of a queen, rests wholly in his imagination and not in truth. L. L. L. says, "if Mr. Kirby says that *few* drones are used for this purpose, &c., he is entirely original in that expression." I have not believed or written anything that would give rise to such a conclusion,

but simply that nature had created drones for the propagation of their race. The article referred to, was condensed from minutes of mine relative to the genitalia of the drone and its probable uses; in which I expressed the opinion, that animal secretion or semen might be conveyed by the workers to the royal larvæ in two or three ways, of which I gave but one; it being placed there for the purpose of changing the physiology of the larvæ to that of a queen. Had the bees the power of speech, they would scoff at the idea of producing a queen by fecundating a worker-larvæ with a *vegetable compound*, or the virgin queens producing *males*, or the workers producing *artificial* queens. They would say that the Author of Nature had made provision for it in their seed.

Rev. L. L. L. dissents from my views of the theories of Dzierzon and Prof. Von Siebold, in reference to the productlon of drones without the male sperm, as "not giving the true history." With all due deference to these eminent observers, for their endeavors to give "a true history" of the honey bee, I would say that a fundamental truth not before discovered, would be no more valuable coming from them, than if made known by some humble though observing peasant. With nearly all egg-laying animals, their *eggs* are fecundated and not their *ovary*, at or about the time they break loose from their ovary. Consequently, the bee must be judged of by a different criterion; her *ovary*, not her *eggs* being fecundated; in which case, spermatic filaments would not be discoverable.

The Rev. L. L. L. has my sincere thanks for noting as correct, the statement made in my article respecting the copulation of the queen and drone bee; putting that subject at rest. As he admits that the workers fill their honey-bags with the juices of the "*smashed up drones*," I should like it better if he had used my language, "semen of the drone," than attempt to mystify it by using the term "smashed up drone" and "drone and worker-larvæ." I have no doubt, had Dr. Dönhoff received the honey-bags for analyzation, he would say they contained *animal secretion*.

Mr. C. W. T. says, on page 186, he will mention one fact which will demolish effectually Mr. Kirby's theory in regard to rearing queens. I am happy to say, that that very fact which he has given, *confirms* my theory. Semen is retained in the combs from the time the drones are destroyed, at least until they appear the following season; and the bees are the same "disgusting little things" as I represented. Mr. L. P.'s communication, in the Bee Journal, page 205, which I read carefully, states that my theory is "the reverse of ten year's experience, and what hundreds of experiments show, &c. They must have been made before the Italian Bee was propagated in this country, or in Germany.

I should advise those who feel an interest in the propagation of the Italian Bee, to read the articles of the Rev. G. Kleine in the Bee Journal, commencing page 16, giving the opinions of eminent apiarians in Germany. Dzierzon could not account for the mystery of the different grades of hybrids. The Baron of Berlepsch states that "the brighter colored queens fecundated when common drones abound, sooner or later produce Italian workers only," and finally came to the conclusion that the *queen's daughters* were the best criterion of genuineness of the Italian Bee, as the *queens* exhibit far more of the hybrid phenomena, than the workers or drones. The Rev. L. L. L. mentions in the Bee Journal, page 166, the phenomena "that the larva which, if developed as a worker, would have been strongly colored, would, in its transformation into a queen, lose all its brilliant yellow," showing their natural proclivity to develop the black blood that they have received either in, or before their transformation. This is complained of by many, and of queens believed to be pure. And I hope to see investigation upon that point, determine whether animal secretion found in the royal cells, does not influence color and purity. This influence may appear slight at first, but sooner or later will develop itself. I believe the Italian Bee can be retained in its purity, with proper care, even in neighborhoods of common bees, if my theory should prove true, of which I have no doubt.

E. KIRBY.

Henrietta, N. Y., September, 1861

☞ That a few drones are occasionally, though rarely, retained over winter, in colonies which are in other respects in a perfectly normal condition, is undoubtedly true. This, however, is only an exception which proves the rule. Berlepsch says that, in three instances, he found some drones, at the close of winter, in colonies which contained only a small amount of worker eggs and larvæ and not yet any sealed brood; and infers that those drones must have have been retained from the previous summer. Had there been any brood nearly mature in capped cells, with some young workers already emerged, he would have suspected that the drones also had been recently produced from eggs laid at the approach of spring—though that would have been quite as singular and rare an occurrence, as the retention of a small number of drones during the winter, in a colony having a healthy fertile queen.

WAX AND HONEY.

The prevalent opinions respecting the origin and nature of wax and honey, as expressed in many treatises on bee culture, and as implied in the definition of the terms as given by the dictionaries, are essentially erroneous. The current impression, derived from these sources, is, that wax is contained in the honey or pollen, and is simply extracted by some process in the stomach of the bee; while honey is supposed to be *made* from the nectar of flowers. Precisely the converse of this is the fact.

1. Wax is a product elaborated by the bees. A simple experiment will suffice to demonstrate this conclusively. If bees be fed with a concentrated solution of loaf sugar aud then confined in a box, we shall in the course of twenty-four hours, find between their abdominal rings thin scales or plates of wax, such as they use in building their combs. Now, probably no one will undertake to maintain that loaf sugar contains wax. It contains only the elementary ingredients of that substance, carbonic acid, hydrogen, and oxygen—which become separated in the body of the bee, and re-combined in different proportions and relations, thus resulting in the formation of wax.

2. It is otherwise in the case of honey. This is in no proper sense the product of the bees, but merely a substance collected by them from the boundless stores supplied by nature.

a. The matter collected by the bees undergoes no change before it is deposited in the cells. The nectar of flowers and freshly-gathered honey are, in all their constituents and properties, one and the same substance. Both have a sweet taste and an aromatic flavor. If we sip nectar from the calyx of the honeysuckle, we shall find that it has precisely the taste of freshly gathered honey. When I analysed the nectar of the wax plant (*Hoya thuya*), which exudes in large drops from the calyx of the flower, I found it was composed of sugar, gluten, and an aromatic substance—which are the constituents of common honey in its pure state.

I fed a colony with a solution of sugar colored with indigo, scented with lavender, and diluted with milk. When the bees had carried this into the cells of a new comb, no difference could be perceived between the contents of the cells and those of the feeding-box—they had the same color, the same taste, and the same smell.

b. If honey or the nectar of flowers remain in the cells, it will in process of time undergo a change. But this change is produced spontaneously, and not by the intervention of the bees, except merely so far as the internal heat of the hive may tend to accelerate it. It results, first, from the gradual evaporation of the aqueous particles contained in the nectar or fresh honey, till a certain degree of consistence is attained; secondly, from the still more gradual dissipation and loss of its agreeable aroma; and, thirdly, from the ultimate conversion of the more saccharine cane sugar, which constitutes an ingredient of the nectar of flowers, into the more insipid grape sugar—a change which all honey undergoes with the lapse of time.

ANALYSIS OF THE EXCRETA OF BEES.

Various opinions are held respecting the composition of the excrement of bees. While most persons regard the contents of the rectum as composed of the indigestible remains of pollen, Dr. Alefeld recently declared them to be uric acid. I have analyzed the excreta, and found the following ingredients:

1. *Remains of pollen.* I boiled the excrement in caustic potash lye slightly diluted. After filtering, I washed the residuum in hot dilute muriatic acid. What was left after again filtering, could from its insolubility, be only the remains of pollen. It appeared under the microscope like an indistinctly granular mass.

2. *Uric acid.* I immersed the excrement in concentrated sulphuric acid, in which uric acid remains undecomposed. After carefully decanting the liquid from the resulting carbonaceous mass, I added water; and then washed the precipitated matter in water. I now added one drop of *liquor ammoniaci* and one drop of muriatic acid. On heating, the mass assumed a purplish hue—the characteristic reaction of uric acid.

3. *Hippuric acid.* I boiled some excrement in caustic potash lye. After filtering, I added dilute muriatic acid, and obtained a precipitate which proved to be composed of uric and hippuric acid.

According to an approximative estimate, the excreta of bees consist of about one-third uric and hippuric acid, and the residue of indigestible portions of pollen. DÖNHOFF.

☞ Two moultings take place while the embryo bee is in its pupa state. The first occurs immediately after its first metamorphosis, or change from the larvæ condition, is completed; and the second when the pupa assumes a brownish hue. At this latter period the cuticle may easily be removed or stripped off, by means of a scalpel. That this cuticle is not an exuviæ or slough remaining from the larvæ state of the insect, is evident from the circumstance that it separates also from the antennæ, retaining the shape of those organs, which, as is well known, do not exist in the larvæ.—DÖNHOFF.

Bees, Wasps, and Humble Bees.

There is this remarkable natural difference between the instinctive habits of wasps and humble bees, and those of the honey bee, that, in the nests of the two former, egg-laying undeveloped females (fertile workers) regularly lay eggs while the queen is present and laying. Whereas, in colonies of the honey bee, none of the undeveloped females (fertile workers) begin to lay so long as a fertile queen is present in the hive. I have found it possible, however, to place the colony in such a condition that eggs will be laid simultaneously by the queen and the fertile workers.

I deprived three colonies of their queens, and afterwards removed also those reared by the bees. As soon as I found that eggs began to be laid by fertile workers, I returned to the several colonies their respective original queens, which were readily accepted—the bees having previously been fumigated and sprinkled with diluted honey. What followed? The queen commenced laying, and the fertile workers continued doing so likewise; for I found, as before, several eggs deposited in one cell, as well as eggs in pollen and royal cells, and there was a continual simultaneous production of drone brood and worker brood. Examining the colonies three weeks after the restoration of the queen, I found this irregularity still prevailing in each of them.

An excellent observer, Mr. Rothe, reports that in a similar experiment made by him, the fertile workers ceased to lay when the restored queen began to do so. The cause of this difference in the facts may perhaps be thus explained. In my colonies the fertile workers probably ceased to nurse the brood, and devoted themselves exclusively to the discharge of their newly assumed function, using the jelly prepared in their chyle stomachs for the production of eggs. Mr. Rothe's colony may have contained a large amount of unsealed brood, and the fertile workers resumed their duties as nurses, when the queen was restored. The jelly prepared in their stomachs was thus again diverted to a different use, and the development of eggs in their ovaries was forthwith discontinued. I am led to adopt this view, from having observed repeatedly that in small queenless colonies, the fertile workers always ceased to lay as soon as pasturage began to fail, and the eggs already laid were then promptly destroyed.—Dönhoff.

East Friesland, a province of Holland, containing 1200 square miles, maintains, on an average, 2000 colonies of bees per square mile.

Interesting Inquiriès.

Let us direct your attention to a few of those features in the natural history of the honey bee, which, notwithstanding all that has been written on the subject, are still deserving of further investigation.

First, in regard to the bee's anatomy. Although it is conjectured that the compound eyes serve to convey to the brain images of *near*, and the simple ones, of *distant* objects, yet this is by no means certain; and any beekeeper contributing such data as would enable naturalists to decide the question, would render a great service to science, inasmuch as that which relates to the bee in this respect, refers also to the other insect races. The same remark applies also to the organs upon the antennæ and wings, as to whether they are organs of hearing or of smell. But this is a more difficult problem, and can be solved only by those who are thoroughly conversant with comparative anatomy as well as with the habits of the insect.

Again: with respect to the formation of the cells and the inquiry regarding their normal shape, there now exists an animated controversy, and all observers who have time and opportunity should direct their attention to this strange phase of insect architecture.

The most interesting subject for the consideration of naturalists and physiologists, however, is that of Parthenogenesis and the queen's power of fertilizing or leaving her eggs unfertilized, so as to produce either workers or drones. And when we reflect that it has but recently occupied the attention of Siebold in Germany, and Owen and others in England, and that the observations of any intelligent beekeeper may serve to throw additional light upon the subject, we hope this will be sufficient to enlist fresh volunteers in the service, who will aid to elucidate this wonderful phenomenon, which so strikingly illustrates the wisdom and resources of the Creator in directing the operations of animated nature.—Samuelson.

☞ Queens of second swarms appear to be less prolific than others during the first season, merely because their colonies are generally comparatively small. Introduce a liberal supply of brood in sealed cells, so that the population will speedily increase, and the queen will soon show that she has been incited to corresponding productiveness, and is fully qualified to assume and discharge the task which surrounding circumstances seem then to impose on her. Such a queen, so situated, being young and vigorous, will sometimes surpass an older one in fertility, even in her first summer.

[For the Bee Journal.]

Wintering Bees.

Mr. King, on page 203 of the Journal, says all his stocks suffered last winter from dysentery, but to a greater extent in the Langstroth hive; and he asks the reason why? He says, he had the honey board removed, but in case the tops were well made and painted, they would be so tight that vapor could not pass off from below. For wintering in a cellar or dark room, an inch auger hole on two sides of the top, covered with wire-gauze to guard against mice, will be found serviceable for ventilation. Mr. K.'s cellar may not be dry enough. My cellar answers tolerably well for vegetables, but is too damp for bees.

In my experience, dysentery has always affected my strongest colonies, and as I have always found their combs mouldy, I attributed it to dampness and restlessness, caused by over-population. My experience is very limited, having only lost three hives by it in fourteen years. It is said to oftener occur in painted hives, wintered either in the cellar or in the open air. When a painted hive becomes damp inside, the sun and air have but little effect in drying it. An unpainted hive will dry out much sooner, and vapor passes off through slight checks in the wood, which paint fills up. This does not apply to old hives, the sides thickly coated with bee-glue.

I, last year, at the suggestion of Mr. Cary, of Colerain, Mass., experimented with six Langstroth hives as follows:—I made boxes about six inches larger every way than the hives. The hives were on stands four inches high. I filled, between the sides and top of the hive and box, with dry leaves, leaving the entrance free for the bees to pass in and out. I gave the top of the box a strong inclination, to shed rain freely. I left the holes of the honey board open. One warm day in March, I removed the boxes from two hives, and examined the bees. I found them perfectly dry and in good condition. In replacing the honey board, I covered the holes to give increased warmth, to induce more rapid breeding. The following fortnight, the weather was very cold, accompanied by high winds. I then examined these two hives again, and found them in a deplorable state, suffering from condensed vapor, and breeding checked; while the hives still protected by the leaves were advancing rapidly in breeding, and were in a perfectly satisfactory condition. I ought to have left some of the holes in the honey board open, after removing the leaves.

Packing hives in boxes filled with leaves, will answer very well for those who have only a few hives; but it cannot, on account of expense, be recommended on a large scale. The French plan of putting the common box hive in a barrel filled with leaves or cut straw, the entrance being left open, is found to answer well; bees swarming earlier in hives thus cared for. This plan, too, would not answer on a large scale. It would require too large an outlay in barrels, and in summer they would be in the way, unless one had a large amount of spare room A few sheaves of straw, placed around a hive to protect it from strong winds, is of great service. Thatching is neater and better. Many bees are lost on windy days, in endeavoring to regain their hive, which, if in a sheltered situation, would be saved. An arbor vitæ hedge, or clumps of evergreens large enough to protect two or more hives from strong winds, and disposed with taste about the lawn, combine both the useful and ornamental. The arbor vitæ forms the closest hedge and gives the greatest protection in winter; but there are some hedge plants which yield a plentiful supply of bee food, that are on this account to be preferred. I must leave this subject to some one better acquainted with it, to enlighten the readers of the Journal.

Piercing winds, in winter and spring, injure bees more than intense cold, unaccompanied by wind.

E. P.

[For the "Bee Journal."]

As I have never seen any account of the distance that the queen will go to meet the drone, or the drone to meet the queen, I thought I would relate a circumstance that has happened in my apiary, this summer. I think it was some time the last of April or the first of May, I had a swarm that lost its queen. I found her dead at the mouth of the hive. I expected they would raise another queen and that she would be a drone-laying queen, as I had no drones nor did I expect any till very late, as my stocks were very light; and that she would be past the time of coupling with the drone, before I had any. As I said, I expected a drone-laying queen; but instead I have got an Italian raising queen. Of course she must have met the Italian drone somewhere, and there was none nearer than William W. Carey's; that is about three miles, till in June, when they were brought within about two miles of my apiary. Now whether the queen went that distance, or whether the drone came to see her, I leave for others to decide.

LEVI DAVENPORT.

Colerain, Sept. 7th, 1861.

☞ *Please send us the names of beekeepers.*

[For the Bee Journal.]

Bee Pasturage.

Those wishing to improve their bee pasturage are advised, on p. 211 of the Journal, to plant Maple, Locust, Chestnut and Linden trees, and to encourage others to do so. In setting out ornamental trees, it is surely worthy one's attention to have regard to their honey-producing power; and to select, with this end in view, those blooming at different times, rather than all of one kind, or those blooming at the same time. I should like to know the comparative value of these trees for producing honey, and also which varieties of those mentioned are the best.

For timber, the yellow locust is the most valuable. It is extensively planted on the western prairies, where it grows very rapidly, and is chiefly used for railroad sleepers. In southern Ohio, bees, some years, gather a large portion of their surplus honey from the Locust. Their industry during the yield from the locust is surprising. Where the tree grows in great numbers, they almost abandon all other sources of supply.

Twenty years ago, an old farmer in New Jersey raised from the seed, about 20,000 yellow locust trees, which, when tall enough not to be injured by cattle, he set out on the roadside, along his fences, and also thinned out his woodland and planted a locust wherever there was a chance for one to thrive. The majority are now worth $1 each for posts.

Some years since, a farmer in the west set out a very extensive peach orchard for fire-wood—the tree being of rapid growth in rich soil. When they began to bear, he marked those that yielded good fruit, saved them and cut the others as needed. In this way, he originated some fine fruit. He remarked that his bees gathered a good deal from blemished fruit, of which there was a large quantity, as he only picked for the use of his family. The same has been noticed in abundant peach years elsewhere; but near a good market, the crop is too carefully gathered for bees to obtain much from this source. "The nauseous Ailanthus" blooms very late The white clover, in my vicinity, suffered from drought this year before the Ailanthus blossomed, and bees worked with unusual activity upon it. I observed this upon an avenue of trees over one mile in length. I have been informed that the timber is extensively used in China (where it attains a large size), in ship building, and the leaves of the young trees for feeding a worm which produces an inferior silk, worn there by the lower classes. The chief need, in closely cultivated districts, is something to fill the gap between white clover and buckwheat.

E. P.

Preparation of Mead.

The following is the process of making mead, practised in Poland and Russia:

Take 120 lbs. of soft water and 20 lbs. of clear strained honey. Mix them well in a kettle of suitable size, and boil down the mixture to 80 lbs. —skimming it carefully while boiling. Then, pour it into a wooden vessel and let it stand to cool. While yet lukewarm, put in a pint of good stock yeast, stir thoroughly, and pour the whole into an oaken barrel (an empty rum or wine cask is the most suitable), which should be sufficiently large to contain ten gallons.

The liquor remaining over, is to be put in bottles, and used to fill up the barrel or cask during fermentation. Now, put into a small linen bag ¼ oz. cinnamon, ¼ oz. grains of paradise, ¼ oz. pepper, ¼ oz. ginger, ¼ oz. cloves, coarsely pulverized, and a large handful of dried elder blossoms. Suspend the bag by a string in the liquor, through the bunghole, and place the barrel in a dry airy cellar. Let the fermentation proceed during six weeks, keeping the barrel constantly full, from the contents of the bottles. Then, after gently removing the bag, rack off the clear liquor into another cask and close the bunghole lightly. Fermentation will still proceed moderately for six or eight weeks, before the liquor becomes clear. It must then be carefully racked off into bottles, and well corked. The lees remaining in the cask may be used in the preparation of an additional supply.

Mead thus prepared will keep for years. It is of a clear amber tinge, and has a vinous taste.

(For the "Bee Journal.")

HIVING SWARMS.

I have found it very advantageous, when hiving natural swarms, to sprinkle the cluster well with sugar-water, four or five minutes before shaking it down. I invariably do this when the cluster is accessible, or can be reached by means of a ladder. I pour the sugar-water into a tin basin, and use a common wisp or hand-brush for a sprinkler. This unexpected shower of sweets is an acceptable treat to the bees, mollifying their temper, and rendering them exceedingly tractable during the subsequent operations. If sufficient time is allowed after the sprinkling, for them to gorge themselves, few will be disposed to fly or sting.

Sprinkling with sugar-water may also be resorted to when the swarm issues before the beekeeper has a hive in readines for it. This will keep the swarm from rising or decamping; and by repeating it at intervals, time may be gained to make the necessary arrangements for its accommodation.

Hopewell. JOHN MILES.

The Antennæ of the Bee.

The antennæ or feelers of the bee are thread-like or *filiform*, as they are scientifically denominated; and if you examine them with a lens, you will find that they are composed of thirteen* cylindrical joints of nearly equal diameter, the second from the head being, however, much longer than the rest, comprising above one-third of the whole organ. With the exception of this one, all the annulated segments of the antennæ are studded over with perforations similar to those upon the third joint of the housefly. These perforations will be more readily detected through the employment of a low magnifying power, or, still better, if one of the antennæ be bleached with chlorine, and a portion of it be then submitted to microscopic investigation. Then you will be able not only to distinguish the peculiar structure of the organs with which it is covered, and to perceive that they are closed sacculi (little sacs), but you may also trace the central nerve that runs along the whole length of the feeler, giving off innumerable branches, one of which communicates with each of the cavities on the surface. This connection of the vesicles or sacculi with the nervous system, in the manner just described, denotes clearly that they are organs of sense.

Thus much has been determined with tolerable certainty; but now comes the problem—what is the character of the sensory function performed by these antennæ. Is it that of hearing, smell, or touch?

That they are organs of touch is decided beyond a doubt; but whether there is combined with this sense, that of hearing or smell, or whether the vesicles are organs that convey external impressions to the nervous centres in a manner appreciable by us, is still an open question; for however carefully they have been examined and compared with the sensory organs in other races of animals, no physiologist has yet been able to pronounce definitely as to their true function.

The bees employ their antennæ for various purposes; amongst others, to ascertain the character and form of objects and substances; as a guide in the construction of their cells; and to communicate information to one another—the last named end being accomplished by crossing their feelers with those of their congeners.

Whilst its antennæ remain unimpaired, the instincts of the bee are wonderfully active and acute; but as soon as it is deprived of these mysterious organs, its whole nature seems to undergo a change, and its psychical or mental state may then be compared to that of an imbecile or insane person—to one, in fact, who has "lost his senses."

With the view of illustrating this observation, we shall repeat two anecdotes related by Huber, and transferred from the pages of Kirby and Spence: "You have seen that the organ of the language of the ants is their antennæ. Huber has proved satisfactorily that these parts have the same use with the bees. He wished to ascertain whether, when they had lost a queen (intelligence of which traverses the whole hive in about an hour), they discovered the sad event by their smell, their touch, or any unknown cause. He first divided a hive by a grate, which kept the two portions about three lines apart, so that they could not come at each other, though scent would pass. In that part in which there was no queen, the bees were soon in great agitation, and as they did not discover her where she was confined, in a short time they began to construct royal cells, which quieted them. He next separated them by a partition, through which they could pass their antennæ, but not their heads. In this case the bees all remained tranquil, neither intermitting the care of the brood, nor abandoning their other employments, nor did they begin any royal cell. The means they used to assure themselves that the queen was in their vicinity, and to communicate with her, was to pass their antennæ through the openings of the grate. An infinite number of these organs might be seen at once, as it were, inquiring in all directions: and the queen was observed answering these anxious inquiries of her subjects in the most marked manner, for she was always fastened by her feet to the grate, crossing her antennæ with those of the inquirers. Various other experiments, which are too long to relate, prove the importance of these organs as instruments of communicating with each other, as well as to direct the bee in all its proceedings."

But the second anecdote will exhibit to us the disastrous effect produced by the loss of these organs.

"The amputation of *one* of the antennæ of a queen bee appears not to affect her perceptibly, but cutting off both these organs produces a very striking derangement of her proceedings. She seems in a species of delirium, and deprived of all her instincts; everything is done at random; yet the respect and homage of the workers towards her, though they are received by her with indifference, continue undiminished. If another in the same condition, be put in the hive, the bees do not appear to discover the difference, and treat them

*According to our enumeration, the antennæ of the drone have each ten of these articulations or cylindrical joints; those of the worker, eleven, and those of the queen, twelve.

both alike; but if a perfect one be introduced, even though fertile, they seize her, keep her in confinement, and treat her very unhandsomely. One may conjecture, from this circumstance, that is by those wonderful organs, the antennæ, that the bees know their own queen."

Although we are not in a position to state decidedly what is the precise function of the antennæ, we may mention that the opinion, derived chiefly from their anatomical structure, is gaining ground, that they are organs of hearing as well as of touch; and their mode of application leads to the same belief. The question is, however, as before stated, still undecided; and it presents a most interesting field of research, not only to those who employ the microscope in the investigation of the anatomy of insects, but also to naturalists who observe their habits; and in either case, the careful student can hardly fail to throw additional light on the inquiry.

There is no doubt whatever that the bee possesses the senses of touch, hearing, and smell, or functions corresponding therewith. The difficulty is to assign them a locality.—SAMUELSON.

☞ In reply to the doctrine still advocated by some that the queen habitually leaves her hive, at intervals and on various occasions, after fecundadation, which was based on the fact that fertile queens were sometimes found outside, Dzierzon relates the following occurrence:—"On a fine afternoon in September, I noticed that the bees of one of my colonies were flying very actively, and observed also that instead of centering chiefly around the entrance of the hive, their attention seemed mainly directed to a spot on the ground immediately below. I instantly surmised that their queen was there, and soon found her surrounded by a small cluster of workers—the entire population meanwhile exhibiting the wildest confusion. It was a beautiful Italian queen which I had frequently seen before, and I at once recognized her as the one belonging to the colony. Now, does this occurrence prove that the doctrine for which I contend, is erroneous? We shall ascertain this from the sequel. The queen was apparently uninjured in her wings, but was entirely unable to fly. Though she had for sometime ceased to lay, her abdomen was greatly enlarged, as though she were suffering from a species of dropsy. I nevertheless returned her to her hive, in which quiet and order were instantly restored. Next day, at about the same hour, this colony again exhibited similar disquiet and confusion. As the queen could not now be found outside, I opened the hive, and discovered her in one of the empty surplus honey-boxes, accompanied by a few bees, and wandering about in an aimless manner. I now examined her more closely, and saw that her antennæ were hanging motionless and that she obviously could no longer use them, they having probably been accidently injured and disabled. The mystery was now explained. The queen deprived of the use of these most important organs, crawled about in the hive without any conscious purpose; and, in short, behaved exactly like those which Huber had intentionally deprived of their antennæ—for those also wandered about confusedly, retired generally to some unoccupied part of the hive, which they endeavored to leave and did desert, so soon as they happened to find the entrance. Now what does the departure of the queen, in the case I have stated, prove? Nothing whatever, so far as regards a healthy and uninjured queen. If a deranged person recklessly rush through fire and flood, we do not thence infer that a sane man would engage in such amusements. Just as little can we deduce any valid conclusions as to the natural habits and instincts of the queen, from the actions of one which has been injured or mutilated, and assume that such an one occasionally or regularly leaves her hive for recreation. What the case does prove, is briefly, that Huber's observations and statements are correct, though many have regarded them as fanciful conceits. It is only when he hazards conjectures and surmises, that we find him partially in error. Nearly all his mistakes of this kind, have however been pointed out and corrected in the notes appended to Kleine's recent translation of "*New Observations*," rendering that work indeed, for all purposes of science, greatly superior to the original French publication."

☞ No second swarm issues from a colony unless *teeting* or *teeting* and *quahking* are previously heard. *Teeting* alone is heard when a queen has emerged from her cell, while the other royal embryos are not yet mature; whereas both *teeting* and *quahking* will be heard when one queen has emerged, while the others, though fully fledged, remain in their cells in apprehension of impending danger.

Prof. LEUCKART reports in the German *General Journal of Natural History, vol.* 3, that M. Asmusz, of Moscow, has discovered in his apiary the existence of an epidemic caused by a species of tapeworm (*Mermis albicans*), which is usually found only in the larvæ of some kinds of butterflies. Singularly enough, this disease is confined exclusively to the drones.

Bee Culture in Common Hives.

No. V.

BY F. W. GUNDELACH.

In June and July, when pasturage is good and the bees can gather honey plentifully, care must be taken to enable them to avail themselves freely of the abundance which nature supplies. They should not be permitted to waste the precious time, by clustering idly on the outside of the hive, because there is no longer room inside for them and the stores they could collect, or because excessive heat may prevent them from laboring within. In the latter case, we should give them requisite ventilation, and supply them with shade, if the hives are unfortunately so placed as to be exposed to the rays of the sun. In the former, they may be relieved by raising the hive and placing an eke under it, or by giving them access to a surplus honey box set on the top. Hives which have so greatly increased in weight, that there is reason to suppose that few of the combs remain empty, should be thus aided, even before the bees begin to cluster on the outside; for some colonies, in their eagerness to store up honey, will at times sacrifice both eggs and brood, casting them out of the cells, in order to make room for it. It may hence happen that such a colony has a superabundance of stores in the fall, with a disproportionably weak population; and is only the more exposed to the danger of perishing in the ensuing winter. On the contrary, a hive which has a strong population, and is nevertheless light, should not be enlarged by additions, either above or below; because the bees would most probably use for comb building the honey they gather, and fail to lay up a sufficient supply for the winter. A colony in this condition, needs only shade and ventilation.

All my hives, whether of straw or wood, have a hole two inches in diameter in the top, which is ordinarily closed with a wooden stopper. As soon as, from its increased weight, I judge that any of these is sufficiently filled, I remove the stopper, and invert over the hole an earthen pot, to the bottom of which, inside, a piece of empty comb has previously been attached. The bees soon take possession, and fill it with combs and honey, which, being generally unmixed with pollen, is of superior quality for table use. I have often removed pots containing from eight to ten pounds, secured by this simple and convenient process. I generally defer removing these pots till the fall, when the weather becomes cool, for then bees are rarely found remaining in them. It is true, I then occasionally find only empty combs in some of these pots, the bees having carried the honey down into the hive. But I reconcile myself to the disappointment, by supposing that, as there was room for it below, it has only been placed where it can be conveniently resorted to when needed; and that the bees have, by prudent anticipation, saved me the trouble of feeding them in the following winter or spring. If they should not need it, they will not waste it.

When the population of any of my old stocks has been so reduced, by frequent or late swarming, that it cannot properly avail itself of the existing abundance of pasturage, I adopt measures to strengthen it immediately. If left to recruit from its own brood, the season will generally have passed before it has become strong enough to labor with energy and effect, and fall flowers are usually a precarious resource. My observations have not favorably impressed me with the plan of transposing such a weakened colony with a populous one; and I have accordingly refrained from resorting to it. The weak colony will indeed readily accept the returning bees of the removed strong one; but the latter at once manifests an inordinately diminished activity, and, moreover, kills most of the bees of the weaker stock, which repair to it wholly unconscious of danger. If, however, I chance to have standing next to the weak stock which I desire to strengthen, a very populous one containing also much brood, I remove the latter while the bees are flying briskly, transferring it to some distant location in my apiary. I then shove the weak stock somewhat nearer to the place where the populous one stood. The returning bees will hover around for some time, looking for their old home, but finally enter the hive of the weak stock, and labor with their wonted industry. The bees of the removed colony will seem inactive for a few days, but being speedily strengthened by the emerging brood, will thenceforward work with redoubled energy. I am always careful to inject a tablespoonful of water into such removed hive, daily, during the first week, that there may constantly be a supply on hand for the benefit of the larvæ.

In districts where buckwheat is not cultivated and wild flowers are not abundant, pasturage usually begins to fail in August, and the drones are then expelled or killed. A colony which, under such circumstances, continues to retain its drones, may be regarded as queenless; and the beekeeper should, therefore, carefully note whether any or how many of his stocks fail to expel them. These should be examined, and, if found to contain no worker but only drone brood, each should be forthwith united with its nearest

droneless neighbor; though, if any be still populous and well furnished with stores, and we have a fertile reserve queen at command, its wants may be thereby advantageously supplied, if proper precaution be used when introducing the queen.

But I usually ascertain the condition of my stocks at a much earlier period, for I invariably examine all those in which young queens have been reared, shortly after the time has elapsed when these should have become fertile, and then apply the proper remedy if such be needed. For this reason, too, I am never much annoyed by robbing bees, for these find none but strong and healthy stocks in my apiary, able to defend themselves, and prompt to resist any attack which may be made.

The drones are sometimes expelled by the bees as early as the beginning of June, when the season happens to be peculiarly unfavorable; and at such time, also, the queen lays eggs very sparingly. Before undertaking in earnest to expel their drones, the bees drive them down from the combs, compelling them to take refuge on the bottom board. If, on lifting a hive, we find the drones thus crowded *en masse* on the bottom board, it is an infallible evidence that the colony has a fertile queen; though it is no proof that the colony is queenless, when they are not found crowded together there.

There is no more certain and expeditious mode of building up an apiary, where common hives only are used, than by preserving, for future occasions, hives filled with comb, and drumming out the first swarms. Even when unpropitious seasons occur, the expelled swarm, if placed in furnished hives, will rarely fail to secure sufficient supplies for the winter; while, if the summer prove ordinarily favorable, it will not only yield a surplus, but not unfrequently send forth a swarm in addition. Last year, my bees began to carry in pollen on the 26th of February, but during the months of March and April, and two-thirds of the month of May, the weather was so adverse, that one of my colonies which I weighed from curiosity, lost five pounds between the 15th of April and the 20th of May. Then a change occurred, and on the 22d of May, it had gained two pounds and a half, and thenceforward the improvement was rapid and gratifying. Still, though I could usually drum out my first swarms in the first week in May, I could not begin to do it that year before the end of the month. On the 26th, I drove out a swarm which I placed in a furnished hive, and observed then that the parent hive contained several sealed royal cells. On the 10th and 12th of June, two afterswarms issued from it, which I placed in empty hives. The driven swarm yielded a first swarm on the 26th of June, twenty-eight days after it was drummed out, and a second swarm on the 6th of July. Thus the parent stock increased to six, all of which gathered sufficient supplies for the winter.

Perils of Fumigation.

When communicating Mr. Hübler's process for introducing queens in a colony (BEE JOURNAL, *page* 111), we informed our readers that "great caution is required in the fumigation of bees with puck-ball fungus." Though we had never used it, we knew from the testimony of numerous concurring accounts, that bees gorged with honey were liable to be killed by its fumes; and that, moreover, if the small kind of puck-ball is used, bees in almost any condition were sure to be destroyed. But some recent experiments made by Mr. Huber, a very intelligent apiarian and old correspondent of the "Bienenzeitung," residing at Niederschopfheim, in the Grand Duchy of Baden, show that this is not the only danger attending the use of the article, nor the greatest evil which may result therefrom--besides failing to secure the safety of the introduced queen, if Mr. Hübler's instructions (not expressed, in all respects, with as much clearness as is desirable,) be not strictly followed. Thus—to begin with the latter point—Mr. Hübler says: "The operation should be undertaken only in the evening, shortly before dusk, and the entire mass of the bees be exposed to the fumes of the fungus." The special reason for operating only at the time mentioned is not assigned, though what is said was doubtless intended to intimate that the operator should seize the moment when *all* the bees have returned to the hive, so that "the entire mass" might be fumigated—leaving no individuals uninfluenced by the effects of the fumes, and disposed to attack the stranger queen when introduced. The operation may hence be performed, with equal safety, at any hour on a dull, cloudy or cool day, when the bees do not leave their hive. But in the heat of summer, if a hive is crowded with bees, it would often be exceedingly difficult to confine the whole population in the dusk of evening, even if some of the bees did not remain out over night; and there would, consequently, always be some risk attending the introduction of a queen, by this process, at that season. Mr. Huber experienced this to his sorrow. He fumigated a colony according to Hübler's instructions, and introduced a fertile Italian queen. Reposing implicit confidence in the success of the operation, he deferred examining the hive till the third day after, when he felt anxious to know what progress the queen had made in supplying the cells with eggs. To his mortification, he found her on the bottom board enveloped by a small cluster of workers; and though he immediately liberated her, and sought to secure her safety by placing her in a cage, she had already been so much injured that

she died the following night. He entertained no doubt that the small enveloping cluster was composed of bees, which, though belonging to the colony, had escaped fumigation, and then regarded and treated the introduced queen as an intruder. They were few in number, yet quite enough to compass her destruction. Here, consequently, is an unanticipated source of danger; and one against which it is difficult, if not impossible, always to guard.

But this is not all. The fumigation destroys all the eggs and unsealed brood in the hive. Such, at least, seems to be the fair inference from all the observations which Mr. Huber made in his own apiary, and the information obtained by him during an excursion to inspect the colonies of other beekeepers who had employed fumigation. —Last June, he fumigated a colony which had brood in three of its combs. This was done expressly to ascertain how the brood would be affected thereby. Three days thereafter, he examined the combs, and found all the eggs collapsed and the larvæ much shrivelled. Two days later, the larvæ was still more shrivelled and had become mouldy. Two days later still, not a vestige of eggs or larvæ remained in the cells; all had been removed, and the three combs contained only brood already capped when the operation was performed.

On the 3d of July, he fumigated another colony of common bees known to be in good condition, removed the queen, and placed an Italian queen on the top of the stupefied mass. On examining the hive next morning, he found this queen also beset by ten or twelve hostile workers. He released her; but as she was immediately assailed again by them, he placed her in a cage for security. Three days after this he liberated her, and she was then received and kindly treated. The hostile workers were probably such as had not been thoroughly affected by the fumes of the fungus, for a dozen or more returned and strove to enter the hive during the operation. In about thirty minutes, he allowed them to enter, and they were probably either not stupefied or with only transient effect.—This occurrence, in connection with his previous experience, convinced him that a queen can be safely introduced by this process, only if it be employed at a season or an hour when we can be absolutely certain that none of the bees are absent.

In this instance, also, the eggs and unsealed brood were destroyed, and all were removed out of the cells before the fourth day following; but, as in the previous case, none of the sealed brood was removed. These results show clearly that a colony may be very seriously damaged, if fumigation be resorted to when the combs are well stocked with eggs and larvæ.

But this is not the chief evil. We hazard the risk of encountering a far greater peril. Mr. Huber believes that foulbrood will frequently result from the employment of the puck-ball fungus, at times when there is brood in the hive. He frequently noticed cases of this disease in colonies which had been thus fumigated for the introduction of Italian queens, though they had previously been healthy. He learned further, on inquiry, that foulbrood prevails extensively in those districts where the fumes of the fungus were customarily employed to facilitate the union of stocks. In one of his own hives, the disease was developed within a week after it had been fumigated. He immediately removed the Italian queen, to check the production of brood, and thus arrested the malady.

The foulbrood, he supposes, does not originate from the decomposition of the unsealed larvæ destroyed by the fumes, for these are promptly removed from the cells by the bees; but from sealed brood, some of which perishes from the same cause. A cursory observer would suppose that the capped brood remains unaffected by the fumes, because it seems to emerge subsequently in a healthy condition. As a general thing, this may be so; but Mr. Hübler conceives, nevertheless, that, occasionally at least, a fatal result is produced, here and there, in some of the cells—probably in those not yet perfectly closed at the time of the operation. As this is not discovered by the bees till mortification or putrefaction has taken place, they do not cleanse these cells seasonably, as they do those in which eggs or larvæ are thus destroyed. Hence, this devastating disease, in its worst form, may originate in such cells, and be rapidly diffused in the hive, when the eggs laid by the newly introduced queen are hatched.

The destruction of the eggs and larvæ in his hives, Mr. Huber remarks, could not have been caused by too free a use of the fungus, as he was particularly careful in that respect. Nor could it have been caused by the heat of the smoke, which was introduced through the stem of a pipe, and made to impinge first against an empty comb. He is convinced that it resulted solely from the inherently noxious nature of the fume, fatal to the tender brood, though the adult bees survive.

Dzierzon has always declared himself averse to the use of puck-ball in his operations among bees, though he has nowhere, that we remember, assigned a reason for declining to employ or recommend it.

[For the Bee Journal.]

Cause of the Mortality among Bees last Winter.

During the last six or seven months, there has been circulated through one Journal and another, many statements of the mortality among bees; not only in this country, but in Europe also. But after stating that such and such apiaries have been nearly depopulated, or that Mr. A, B and C, have lost all of their young swarms and many of their old stocks, we are left in the dark as to the probable cause of such a calamity. At least, such is the case as far as I have seen, with the exception of your remarks in the March number of the "Bee Journal," in answer to a correspondent, who makes inquiry as to the cause of the malady that swept away so many bees the last winter and spring.

That the want of "sufficient upward ventilation" may, in some cases, be the cause of dysentery in bees, I do not doubt; but in the greater number of cases that fell under my own observation, especially in my own apiary, I am positive the disease was attributable to some other cause, viz: the quality of the food upon which they fed. One fact that transpired among my own bees I will relate, which, though not proof positive, strongly leans towards the support of such theory, to say the least.

I attempted the wintering of seven colonies, three old stocks and four young swarms. They were all very nearly in the same condition, as regards ventilation, amount of honey stored, &c.; but one of the old stocks had honey in their hive that had remained sealed for three years; another was fed about 10 lbs. of West India honey in the fall; while the remaining one had barely sufficient stores to carry them through the winter of '59. Consequently, it was on about the same footing with the young swarms in the fall following, with this difference: it had, probably, stored some food in the spring before the new swarms had set up for themselves. Probably, neither colony had less than 30 lbs. of honey stored for winter use. The mode of wintering was the same as I have adopted for the last five winters, with perfect success. The boxes were all removed and the caps put on —leaving the passage ways open. The hives removed to an unfinished chamber in the dwelling house, keeping them removed from the light and the influence of the sun, as much as possible. Now for the result.

Of the seven colonies, only two survived the winter. Those two, being the old stocks that had food independent of the supply gathered during the summer of 1860. The other stock lingered until the middle of April—the swarms having died before the 10th of February. Now, it appears plain to me, in this case, that the quality of the food consumed, had some effect in saving those two colonies; from the fact, that the honey gathered years previous in one hive, and that fed to the other, was consumed to the exclusion of that gathered in the summer and fall of 1860.

And in the case of the other stock, why did they linger along some two months longer than the swarms, and then die? Was it not because they had laid up a short supply of honey in the spring and early summer, not sufficient to carry them entirely through the cold season? Hence, having to resort to their late gathered stores, which induced disease, the effect was fatal.

But the question will be asked, why did honey contain such peculiar properties last year, and not the year before, or any other year? The reason I assign is this: Last year, owing no doubt to a peculiar state of the atmosphere, it being an extremely dry and withal cold season, a variety of aphis or plant louse was very abundant upon the common swamp alder. From the exudations of these insects, the bees gathered large quantities of honey; some swarms storing nearly 40 lbs. in about three weeks, during the latter half of August and first of September. This honey was of rather poor quality, though better than that gathered from the various weeds at the same time of the season; but after remaining in the hives some months, it was rather thinnish, and in flavor perceptibly acid. This acidity caused a very laxative state of the intestines, similar to dysentery; and the bees, being prevented by the cold from leaving their hives to void their fœces many days in succession, were unable to withstand the demand of nature, and were thus necessitated to void their excrements within the hives. The stench arising from such a state, was that of putrefaction. The effect of breathing this fœtid atmosphere, proved fatal to the entire colony, in from six to thirty days.

The present season, but very few of the aphis are to be seen upon the alders. Perhaps the countless millions of another variety, upon the crops of wheat and oats, may account for their disappearance in that quarter.

To guard against a like calamity and insure the safe wintering of bees in all seasons, I propose to feed each colony, late in autumn, 10 or 12 lbs. W. I. honey, as the empty brood comb in the centre of the hive will usually hold that amount. The cost would be but trifling, especially if bought in an unclarified state.—I think it would not exceed 20 cents per gallon, of 12 to 15 lbs.

Andover, Maine. FRYE, JR.

THE BEE MOTH.

Mr. Kaden, of Mayence, placed a second swarm in a new and clean hive, which had just been made for the purpose of this experiment, and set it remote from every other hive on his premises. Daily, at dusk, as soon as the bees ceased to fly, he carried this hive into the dwelling house, and deposited it in a chamber where moths or millers could not have access to it. On the eighth day, he drummed out the bees, took out the combs (containing pollen and honey, but no eggs or brood), and placed them under a bell-glass, so adjusted that no insect could enter. In less than three weeks, the combs were perfectly alive with worms. As the bee moth does not fly during the day, and the hive was regularly removed every evening to prevent its entrance at night, and the combs were all newly built, whence did these worms originate?

☞Some persons object to "special operations" and "artificial processes" in bee culture, because they regard them as "unnatural" and as "interfering with the instincts of the bee." But is not hiving a natural swarm an "artificial process?" Yet no one except the timid, objects to engage in that "special operation," though it is obviously a most violent "interference" with the instincts of the bee! Bees are not kept for the purpose of indulging them in the enjoyment of the "largest liberty" or gratifying their own wildest whims. The object and intention is rather to render them and their labors subservient to man's wants and desires; and he who can most completely control them, within their own proper sphere, is likely to derive the most benefit from them.

Mr. KLEIN, now a successful and distinguished apiarian at Tambuchshof, in Thuringia, once trapped and killed more than five thousand drones from a single old stock, which had for years been managed on the magazine or *nadiring* system. This colony had never yielded him any surplus honey, but required feeding every fall. Since he has abandoned that system, and introduced movable comb hives, a thousand drones could seldom be found at one time in his apiaries, and he obtains ample yields of honey.

Prest. BUSCH says he once saw thousands of bees gathering honey from the heads of common red clover, recently mown and partially wilted. They tore open the calyx at its base, and thus obtained access to the nectar which they are unable to reach when the blossom is full blown and fresh.

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Monthly Management.

NOVEMBER.

The days are now rapidly becoming shorter, and the weather colder. The bees are seldom seen flying, except about noon, when the sun chances to shine bright and warm, but remain quiet in their hives, congregated in dense crowds between the combs—generally perfectly motionless, and not giving audible signs of life. Still, occasionally, fine days occur, which enable them to fly briskly and discharge their fœces. The later in the month they have an opportunity to do this, the better, and the more likely are they to endure, without inconvenience, the close confinement which awaits them during the winter. Should the bees of any colony in an apiary neglect to avail themselves of such an occasion, while others are eagerly embracing it, they should be roused by gently tapping on their hive or breathing into its entrance, particularly if they have not flown for a considerable time. Bees which have, during the latter part of the season, increased their stores much by collecting honey-dew, or which were fed liberally with diluted honey, will be greatly relieved and benefitted by such late excursions.

If any stocks are insufficiently supplied with stores, it would be rather late now to offer them diluted honey; better give them honey in the comb, if to be had, and movable frames are used. In common hives, sticks of candy may be inserted between the combs; or, where it can be done through a hole in the top, a small coarse sac filled with a stiff paste, composed of a mixture of honey and sugar, may be placed in the combs, over the cluster—covering it properly to prevent the escape of heat. Supplies may thus be administered even in midwinter, if care is taken not to disturb and arouse the bees.

Those who are in the habit of wintering their stocks in dry cellars or vaults, should be in no haste to remove them thither, but afford the bees full opportunity to enjoy any fine weather which may occur late in the season. It will be early enough to transfer them to their destined quarters, at the close of this month or the beginning of the next; for winter rarely sets in fully, before that time. The entrances of hives so placed, should not be closed. There will be no occasion for this, if the depository be cool and can be kept dark. A few sprigs or nails driven in the bottom board before the entrance, half an inch apart, will exclude mice, and still admit a sufficiency of air. Traps, properly baited, should be used to catch any rats or mice which may prove troublesome in the winter. Cats, if admitted, would be apt to disturb the bees, by running or leaping on the hives.

Bees, not removed from their summer stands, will rarely need any extra protection during the winter, if their hives are made of ordinarily suitable material, and they have a full supply of honey. Still, if the hives have a southern exposure, they should be shielded from the rays of the sun by erecting a temporary screen before them. The bees will then pass the winter in more uniform repose, and consume less honey. But, on mild days, when the bees can fly, the screen should be removed, to give them an opportunity to issue and discharge their fœces.

STUPEFYING BEES.

For conveniently stupefying bees, Dr. Raven employs the simple gunpowder squib, made as boys make them for their rather dangerous sports. A squib 1½ inch high and 1 inch in diameter is sufficiently large to subdue an ordinary colony—taking care that it be neither so moist as to prevent it from burning, nor so dry as to explode A slow match is used for firing the squib, over which a wire gauze protector is set, to prevent the dropping bees from being burnt. The fumes do not perfectly stupefy the insects, but render them entirely manageable; and the recovering bees will be peaceably received by any stock to which we may wish to unite them.

Berlepsch thinks that the low and continued hummming heard in some hives, in extreme cold weather, is not produced by the action of the bees' wings. He once cautiously opened a hive on such an occasion, when the thermometer in the open air was at 24° below zero. The bees were packed in dense masses between the combs. The humming was still heard, though there was no motion of wings perceptible among the bees on the exterior of the clusters; and it is hardly conceivable that those confined in the interior would have room to move theirs. He suspects that the sound is produced by means of their organs of respiration, or results from some action of the tracheal system.

Berlepsch says he never saw drones emerge from their cells *before* the 24th day after the eggs were laid, and always only a few *on* the 24th. On the 25th and 26th they came forth in multitudes. Drone brood seems to requine a higher temperature than worker brood; for in some combs which he transferred to the sides of the hive the former perished, whilst the latter emerged only a day or two later than usual.

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Development of the Queen.

BY DZIERZON.

Though I have repeatedly adverted to the subject of the period of time required for the development of the queen, I consider the topic is of sufficient importance, in a practical view, especially as regards the artificial multiplication of colonies, to deserve renewed consideration. For, if a young queen leave her cell only an hour sooner than the beekeeper supposed she would, he might find that all the royal cells which he designed to use, had been summarily destroyed.

To avoid misconception, we must first determine at what moment our enumeration of time shall begin, and to what period it shall extend. We cannot reliably undertake to begin to count from the moment when the royal cells are started, for the bees sometimes select an egg, sometimes a recently hatched larva, and sometimes one several days old; and it is, in most cases, impossible to ascertain when they commenced operations for the production of a queen. Again, not unfrequently the larva is supplied with royal jelly in such abundance as fairly to float therein, before any change in, or addition to, the cell is perceptible. To begin with the moment when the egg is hatched and the larva disclosed, is usually just as uncertain and impracticable, because for such purpose, we should have to employ a microscope, and prosecute our observations without an instant's intermission; thus involving continual disturbance of the colony, at a time when calmness and quiet are essential to the uninterrupted and natural progress of development. It would seem best, therefore, to commence with the moment when the egg is laid, provided we can assume as a fact that the brooding is duly and regularly prosecuted; because without this, there may be a difference of several days, according to circumstances, in the results of our observations, and we should thus reach widely varying conclusions.

The period *to* which we should count, is equally important, and is by no means a definite one. Properly speaking, a queen is fully developed only when her ovaries have attained their proper functions—being filled with egg-germs, some of which are so far matured that she can begin to lay. But as her fecundation is dependant on various contingencies, and may be indefinitely delayed, we may assume that her development is complete when she has attained the state of puberty. But even for this there is no fixed time, since it is greatly dependant on the variations of season and temperature, the supplies of nutriment, and the active or inactive state of the colony. Thus, under favorable circumstances, the young queen may make her hymeneal excursion as early as on the third day after leaving her cell; or, under unpropitious conditions, she may not feel any impulse to leave her hive for the first ten days, especially at a period when the workers are inclined to inaction.

A more definite and more easily determined date, is the period at which the queen has emerged from the cell, and is able to move about freely among the bees; and as this is a period of much importance in practice, it is with special reference thereto, that I shall endeavor to answer the question:—In how many days from the moment the egg is laid, can a queen be so developed and matured, as to be able to perforate the cap of her cell and emerge?

On a former occasion, I stated that the queen, developing more rapidly, and maturing about three days sooner than a worker, might be ready to leave her cell in sixteen days. Of the fact, I had no doubt, though it ever seemed to me to be

remarkably singular that the queen, which all regard as the most perfectly developed, and which, with respect to her sexual qualifications, is unquestionably such, and the duration of whose natural life extends to almost as many years as the workers, on an average, attain months, should reach maturity in a much briefer space of time than her congeners. Are we not in error when assuming so short a term? By no means. The term is not taken too short; but, on the other hand, is rather too extended. Under specially favorable circumstances, the queen does not even need fully fifteen days for perfect development. Of this, I have been convinced by an experiment made last summer, in such manner as to preclude all possibility of mistake.

In the forenoon of the 13th of June, I introduced one of my finest Italian queens into a colony from which I had previously taken a number of royal cells, and which contained only a small portion of capped worker brood. I placed her directly among the bees on the brood-comb, which may generally be done with safety when the colony has been long deprived of its queen. On examination in the afternoon, I found that no eggs had yet been laid, though it was evident from the deportment of the queen, who had been promptly accepted by the bees, that oviposition would not be long delayed, and it may have been commenced on the evening of that day. On the 17th, I removed from the hive a brood-comb containing a number of eggs and small larvæ, and gave it to a nucleus to raise queens. Now, if sixteen days are required for the development of a queen, none reared from larva proceeding from eggs laid in the evening of the 13th of June, could emerge before the 29th. But on casually opening the nucleus on the 28th, I was not a little surprised to discover a young queen already emerged, and actually engaged in attempting to destroy one of the other royal cells, which I hastened to rescue from her attacks. This was in the forenoon of the 28th. That the egg from which this queen was reared had not yet been laid in the *forenoon* of the 13th, is beyond all question, for it was *then* only that the queen was introduced. It may be asked whether Italian queens do not develop still more rapidly than the common kind? I incline to think so. I have very frequently found them emerged on the 10th day after constructing an artificial colony. A stock of common bees very rarely yields an after-swarm before the 14th day after a swarm was drummed out, or the queen removed. But if common queens ordinarily emerged in ten days, we should suppose that the after-swarm might readily issue on the *twelfth* day —though such an occurrence has never come under my observation.

And here another consideration, respecting the brooding of the eggs and the disclosing of larvæ therefrom, presents itself. It is very certain that, in the case above stated, the eggs must have been carefully brooded from the instant they were laid. This is always the case when the workers have had no brood to nurse for a considerable period, and have a large supply of pollen in the cells, and also a store of digested food in the chyle stomach. They will, in such case, feed the first disclosed larvæ so lavishly, that these float in the jelly like royal embryos.

But have the bees power to hasten the hatching of the eggs, and did they exert this in the case referred to; or is it necessary, as with birds' eggs, that a definite period should elapse before the young can pierce the shell and emerge? I am inclined to accept the former alternative. Warmth alone, certainly does not accomplish it, since, in the greatest heat of summer, unbrooded eggs remain unhatched. But in what does this brooding consist? Does it involve in its requirements the evolution of increased warmth and the aid of moisture, or does animal heat alone suffice? Do the bees contribute in any other manner to the more speedy disclosure of the eggs, possibly by moistening the surface and thus facilitating the rupture of the shell? What is the temperature best adapted to the conservation of the eggs? What degree of cold can they bear without injury?

These and other analogous questions are as yet unanswered, and beekeepers who have leisure and opportunity to make the requisite investigations, would advance the interests of bee culture, and render service to natural science in general, by laboring to solve them. They are not only interesting in themselves, but of great importance in practical bee culture. Should the conjecture submitted by some apiarians, that bees' eggs may be preserved almost indefinitely, by immersing in honey the combs containing them, the transmission of Italian stock to distant points might be greatly facilitated. Entertaining great doubt as to its feasibility, I have hitherto refrained from testing the matter by experiment.

August 30, 1861.

☞Writing to M. Dzierzon in November, 1854, we suggested to him that fresh laid eggs of bees might probably be preserved for weeks or months, without injury to their vitality, if the comb containing them were immersed in honey, and given to a strong colony when it became desirable to have them hatched. If this be practicable,

various obvious advantages might be secured. In reply, Mr. D. did not doubt the feasibility of thus preserving the eggs uninjured, but apprehended that the bees would not be able to remove the honey, afterwards, without destroying them. This might be so if the honey used were old and thick, and remained in the cells long enough to become candied; but if recently gathered, or employed while still very liquid, we should not anticipate any difficulty from this source. It would seldom be necessary to keep the combs immersed longer than six or eight weeks.

THE EYE OF THE BEE.

It appears to us questionable whether the normal shape of the lenses, in the compound eye of the bee, is hexagonal, or whether this form is not rather a necessity of growth; that is to say, we think they are normally round, but assume the hexagonal shape during the process of development, in consequence of their agglomeration. If this surmise be correct, it applies equally to the compound eyes of all insects; and our inference in this respect is drawn—

1. From the exceptional character of hexagonal or any other than circular lenses in the eyes of all animals, and from the fact of the simple eyes of insects themselves being *circular*.

2. From the circumstance that, in the insect races, the conical lenses of the ocelli (the three simple eyes of the bee), which do *not* impinge one upon another, are not hexagonal, but round.

3. Because, in the posterior angle of the compound eye of the worker-bee, we often find some of the *corneal* or external lenses of a smaller size, and not adherent, but having a little intermediate space surrounding each; and these facets are *invariably round.*

4. From the fact that in one insect at least, the sheep tick (*Melophagus ovinus*), which ranks very low in the scale of development, we find ALL the external facets of the compound eyes non-adherent and circular.

A careful examination of the eye in the pupa, whilst in process of development, confirms the opinion here expressed.—SAMUELSON.

☞Bees naturally delight to dwell in the shade, and revel in the sunshine. A Siberian forester lately found a colony of bees in a hollow fir tree, the decumbent limbs and dense branches of which completely excluded the sun's rays from the main stem. The end of a decayed and hollow root, projecting above the ground, formed the entrance of a gallery through which the bees passed in and out.

Honey.

HONEY is secreted in the nectaries of flowers, whence it is extracted by the bee, with the aid of its delicate tongue or proboscis. A portion, at least, of the harvest or gathering is retained by the insect in its crop or paunch, and this is ejected into the cells of the honey-comb, on the bee's return to the hive, to serve as a store for the winter.

This substance is so well known, that a description of it appears almost superfluous; but we may mention that pure honey is yellow, viscid, granulated, and very sweet. It contains two kinds of sugar, the one analogous to that from the grape, the other to that from the sugar-cane. It contains also a yellow coloring matter, a little wax, gum, and, according to some authors, an aromatic principle, and a slight trace of what appears to be acetic acid.

You say, therefore, that even *pure* honey is a very strange compound, and possessing, as it does, considerable value, you will not be surprised to hear that it is rendered still more complex by adulteration. This is effected by various means, some of which render it more liquid, others more solid; and if we have recourse to the microscope, an instrument that has done so much towards exposing the dishonest practices of traders, we shall find, that when honey is adulterated with sugar, there is a marked difference in the form of the crystals it contains.

There are two qualities of this product: *Virgin Honey*, which is allowed to run from the comb, and, being therefore unmixed with any foreign substance, is the purest and most valuable; and another kind that is expressed from the comb, after the first has run off.

The finest description of honey, known as pure Narbonne, is produced in the central provinces of France, and is exported in considerable quantities. It is hardly needful to add, that good honey may be found in every quarter of the globe.

Baron EHRENFELS was in error when stating that, in a state of nature, swarms avoid locating themselves in the vicinity of established stocks. Several instances are now known where two colonies of wild bees were found occupying different parts of the same hollow tree. Dzierzon, also, mentions a remarkable case, where four natural swarms, coming from a distance at different times, voluntarily entered and took permanent possession, respectively, of four compartments of a compound hive arranged for five stocks, into one of which, a colony had already been placed.

[For the Bee Journal.]

Who will Explain the Mystery?

An article with the above heading over my signature, appeared on page 206 of the Bee Journal. An exposition (?) of the "mystery" therein specified, makes its appearance over the signature of L. Pierce, on page 232 of the Journal. The remarks of my contemporary I have read with much pleasure, but must dissent from the conclusion deduced in reference to the "mystery."

The appearance of *drone-brood* in *worker-cells*, discovered by Mr. Pierce, is not at all surprising—it is precisely what might have been expected. It appears that one wing of the queen was defective, which, very probably, prevented her flight with the drones, and also that the *sealed brood* was not observed until "*several weeks*" after the queen had emerged from her cell. These facts are sufficient to justify the conclusion that this is a case of *retarded impregnation*, which usually produces drone-egg-laying queens.

We will now look at the *facts* that have reference to the "mystery:" A colony was divided; one division reared a queen; the queen was seen on the nineteenth day after the division; she was quite *young*, which was evident from her *light* color, and was not, so far as could be observed, physically defective, nor did she have the appearance of being fertilized; this same division had built a large amount of drone-comb; on the surface of one of the newly made *drone-combs*, was found a *royal cell* containing *larva* nearly ready to be *sealed* on the day of examination, which was at the same time the young queen was observed; there were no eggs nor larvæ aside from that in the royal cell. The "mystery," it is evident, is what deposited the egg, from which the larva in the queen-cell originated, in the drone-cell? Or, in other words, how came it there?

Mr. Pierce concludes that "it was an attempt by the bees to rear a queen from the drone-larva of an unimpregnated queen." From this, I conclude that he refers to the young queen found in the hive. There might be, it is true, a *possibility* that a young queen, say two or three days old, should deposit one or more eggs before being impregnated. It appears, however, to me that such instances must be extremely rare, especially when the weather is favorable and the queen not defective.

A question might arise as to the precise time when the young queen that was found, emerged from her cell. Not seeing her emerge from her cell, we can only judge from the facts given. It usually requires, in Western New York, sixteen days to perfect queens from the deposition of the eggs; much depends on the temperature. When rearing queens artificially, they have been known to be produced in eleven days; in such cases, the bees most probably select a larva some four or five days old. For the pleasure of investigation, we will suppose that the young queen, found in the colony above referred to, emerged from her cell on the eleventh day after the division, then she must have been eight days old when the examination was made, at which age they are generally fertile. From the appearance of the larva and the royal cell encasing it, I should judge that the larva was at least seven days old; then, admitting these *inferences* to be *facts*, the queen must have deposited the egg when *one day old!* I have taken an extreme case to attempt to prove the *possibility* of the correctness of Mr. P.'s deduction; but the more I investigate, the more firmly am I impressed with the belief that it is an erroneous one. I shall again, therefore, have to draw my remarks to a close in these words: "Who will explain the mystery?"

M. M. Baldridge.

Middleport, Niagara Co., N. Y., 1861.

CHLOROFORM.

Chloroform has been employed to stupefy bees. A correspondent of the *Edinburgh Evening Courant* has adopted this plan successfully. The quantity of chloroform required for an ordinary hive, is the sixth part of an ounce; though a very large hive may take nearly a quarter of an ounce. His mode of operation he describes as follows: "I place a table opposite to and about four feet distant from the hive; on the table I spread a thick linen cloth; in the centre of the table I place a small shallow breakfast plate, which I cover with a piece of wire-gauze, to prevent the bees from coming in immediate contact with the chloroform. I now quickly and cautiously lift the hive from the board on which it is standing, set it down on the top of the table, keeping the plate in the centre; cover the hive closely up with cloths, and in twenty minutes or so, the bees are not only sound asleep, but, contrary to what I have seen when they are suffocated with sulphur, not one is left among the combs; the whole of them are lying helpless on the table. You now remove what honey you think fit, replace the hive on its old stand, and the bees, as they recover, will return to their home. A bright, calm, sunny day, is the best; and you should commence your operations in the morning, before many of the bees are abroad.

Historical Sketch.

BY PRESIDENT F. B. BUSCH.

Until the times of Swammerdam and Reaumur, very little of any importance or value, relative to the natural history of the honey bee, is to be found in ancient or modern literature. With them, and in consequence of their researches, a brighter era begins to dawn. To what student of natural science is the "Bible of Nature" an unknown volume; and who that has taken an interest in bee culture, is unacquainted with the "*Memoirs for the History of Insects?*" Both of these naturalists, whose investigations and descriptions are yet unsurpassed, were still, however, in error on some points relating to the bee, and failed to discover several of the most interesting facts. Both were of opinion that the queen was fecundated by the drones in the interior of the hive; and Reaumur believed that the workers were of neither sex, or neuters.

These and similar views continued to prevail among the learned till the time of Schirach, whose pre-eminent merit it was to demonstrate that a queen could be reared from worker-larva. Though this may have been known to some extent before, and have even been practised occasionally by the beekeepers in the isles of Greece, Schirach was undoubtedly the first who clearly demonstrated and widely promulgated the truth; though he, too, erred in supposing that the desired result could not be effected by means of an egg, and that the larva, moreover, must not be more than three days old.

It was at this period, also, that Reaumur's opinion, that the workers are neuters, began to be called in question. Doubts concerning this opinion, were first suggested by observing that in some artificial colonies, in which the workers had failed to rear a queen, eggs, drone-larvæ, and drones occasionally made their appearance.

The Apiarian Society of Franconia, under the lead of the Rev. Mr. Eyrich, now became active and prominent laborers in this field. Frederick Herold and John F. Steinmetz announced and advocated a new theory, one of the chief points of which, was the doctrine that some of the workers are males. This led to a controversy between the Upper Lusatian and the Franconian Societies, which was conducted with much acrimony, but left the question unsettled.

About the same time, Janscha, a teacher of bee culture at Vienna, distinguished himself by his elucidations of theory and his successful practice. It was he who first announced, as the result of his personal observations, that the young queens leave their hives to meet the drones in the open air, and that impregnation, once accomplished, sufficed to secure their fertility during life. He also rejected the theory that some of the workers are males. Under his superintendence, the Apiarian Institute for instruction in practical bee culture, established by the Empress Maria Theresa, and located at Belvidere, near Vienna, produced many excellent teachers, and disseminated much useful information. And though the captious Spitzner advanced many specious and plausible objections against the doctrines there inculcated, and professed to discredit their alleged observations, most of them were ultimately admitted to be correct. Janscha's views were adopted generally by the Austrian writers; and also by Pösl, in the Palatinate. But elsewhere, and especially by the Apiarian Society of Upper Saxony, the notions previously prevalent were adhered to and defended.

Now, the celebrated Francis Huber suddenly appeared on the arena, and attracted attention by the publication of his "New Observations on Bees," in a series of letters addressed to M. Bonnet, the naturalist. Huber's labors have been variously estimated, and we shall, therefore, advert somewhat more fully to him and his opponents. It is well known that he was blind, and had to avail himself of, and rely on, the services of his assistant, Burnens, while prosecuting his investigations. Partly for this reason, and partly because he was believed to have a lively imagination, his statements were received with distrust in many quarters. Huish denounced him as a charlatan in England, and Spitzner ridiculed and undertook to refute him in Germany. The latter published a treatise in which he recapitulated the theories and systems of former apiarians, and criticised Huber's views and observations in a highly supercilious tone. Nevertheless, many of the more important of Huber's statements were speedily verified by the investigations and experiments of other disinterested parties; and it was soon discovered that Spitzner, despite of his critical acumen and dialectic skill, was much less reliable as an observer, than the blind naturalist whom he had so violently assailed. Still, Huber was occasionally, though rarely, in error. Thus, his notion about the great annual laying of drone-eggs by the queen, and its results, is now known to be a mistake; and on some other points he was obviously laboring under wrong impressions. Though these and similar errors may now be noticed in his writings, his merits as an investigator of the habits and instincts of the bee, are unquestionably of the highest order, and consti-

tute the basis of an honorable and permanent fame.

Far below Huber, though still with fair claims, stands his contemporary Riem, who translated the "*New Observations*" into German—overloading it with his own notes and comments, which do not always evince sound judgment. It was his good fortune, however, to discover and prove the existence of fertile workers; and he contributed largely, also, by his extensive correspondence and numerous publications, to excite a more general interest in bee culture.

Spitzner, who possessed an inordinate share of self-conceit, had no clear and settled ideas respecting the sex of the bees—being uncertain whether there may not be two kinds of males among them, as there seemed to him reason to suppose that there are two kinds of females, queens and fertile workers. His works were popular for a season, but have long since fallen into deserved neglect.

Another prominent and active opponent of Huber appeared at the commencement of the present century, in the person of the Rev. W. Matuschka, a very prolific writer, who published his peculiar notions in several treatises, in 1802 and 1804. He boldly repudiated the doctrines of Swammerdam, Reaumur, and Huber, denied that the drones are males, and asserted that the true males must be looked for among the workers, though he contended that some of these are females. According to him, also, drone-mothers are regular inmates of the hive, and the queen never lays drone-eggs. He had many adherents, and, till quite recently, some of the more prominent German writers adopted his views in the main, though differing widely among themselves.

It is unnecessary to notice specially the writings of Wurster, Ramdohr, Christ, and others. They possessed only secondary and transient interest, and are of no historical importance.

Nearly contemporaneous with Matuschka, was John Christian Knauff, who distinguished himself by great practical skill and acute observation. He dissented from Huber respecting the sex of the bees; contended that the queen, in a healthy condition, never lays drone-eggs; and that these are always laid by certain fertile workers appropriately called drone-mothers. He disbelieved that the worker-eggs were individually impregnated, and claimed that fecundation affected the ovaries generally. He had not enjoyed the advantages of a liberal education, and employed others to write for him the works published in his name, and of which he is, doubtless, substantially the author. He was remarkably skilful and adroit in practical operations; and his little manual, describing his various manipulations and processes, was an interesting and popular work. Had he been Huber's assistant, he might have rendered the most important service to science. But "his lot forbade." He died poor.

The next distinguished name in the annals of apiculture, is that of the Baron of Ehrenfels, whose treatise, written in popular language and entering minutely into the natural history of the bee, has found hosts of delighted readers and admirers. He concurs with Huber as to the sex of the bees, but adopts the drone-mothers as regular members of the household. What, however, most excites surprise, is his notion that the nuptial excursions of the young queens, which Janscha, Huber, and Knauff have described, are mere preparations for the marriage, which he conceived was immediately thereafter consummated within the hive.

Nicholas Unhoch was a zealous apiarian, who made numerous observations on bees, as his book, published in 1823, with numerous illustrations, clearly proves. But with all his zeal and energy, he appears to have lacked the true observing faculty, and was unacquainted with the advances which had already been made in the branch of science to which he devoted himself. He rejected the doctrine that the queen is impregnated by the drones.

Mussehl's investigations in this department of natural history, deserve respectful notice. They are embodied in his translation of Nutt's treatise —of whose ventilating system he was an ardent admirer and zealous advocate; and he was an equally strenuous opponent of Knauff's peculiar tenets.

Klopfleisch and Kürschner also subjected the views of Knauff to strict scrutiny, and made numerous experiments to test their accuracy. They coincide with Huber on most points, though holding with Knauff as to the origin of the drones. Their treatise is interesting and valuable, chiefly as containing some satisfactory elucidations of Huber's principles. It was published at Jena, in 1836.

M. de Morlot's work on "Bee culture, theoretical and practical," appeared three years later. It adheres rigidly to Huber's views, and furnishes little besides of any value.

The latest publication, devoted exclusively to the natural history of the bee, is that of F. W. Gundelach, published in 1842, and the supplement thereto, which appeared in 1852. This treatise is the result of the author's long continued and careful observations, and, besides various new discoveries, furnishes renewed confirmation

of some of Huber's more important observations. At the time of its publication, the author was still, on the main, an adherent of Knauff; but afterwards modified or changed his views.

We close this sketch by adverting to the establishment of a Monthly Journal of Bee Culture, by Anthony Vitzthum, in 1838, which was sustained for six years, or until the death of the editor. It was succeeded by the "Bienenzeitung," which is published semi-monthly, and is edited by Dr. Barth and M. Schmidt. It is a gratifying sign of the times that, with only a transient intermission caused by the death of M. Vitzthum, a periodical devoted exclusively to bee culture has sustained itself in Germany for more than twenty years, with steadily increasing reputation and usefulness.

[For the Bee Journal.]

Kirby's Theory vs. Langstroth's.

Mr. Kirby has at last got himself and his theory into a tight place. He says, Bee Journal, p. 252, "Semen is retained in the combs from the time the drones are destroyed, at least until they appear the following season." Here is a positive assertion that Mr. Kirby has got to prove, if he wishes to sustain his theory, for in no other way can he account for the production of queens in winter, or in the absence of drones; that is, according to his theory. If semen really exists in the bee hive in winter, stored up in the combs, the microscope will show it, and I hope Mr. Kirby will employ some of his spare time, during the present winter, in procuring the necessary proof; for without it, his theory cannot stand.

It seems to me, that considerable confusion must exist in the minds of the advocates of the above "Theory," in regard to the different functions of the organs of nutrition and of generation, or reproduction, and as to these functions being in any way interchangeable. Here we have it asserted that a substance, the semen of the drone, taken into the alimentary canal of the bee, and subjected to the action of the organs of digestion and assimilation, will produce a hybrid or cross in the blood! Is not this "something new under the sun?" I know that there are some agriculturists on a small scale, who believe in "potatoes mixing in the hill." This would be a case in point, taken from the vegetable kingdom, but the fact, like Mr. Kirby's theory, needs proof. We are also all aware, that there are thousands of white children born at the South every year, who never know any other than negro nurses, and I would as soon expect to account for the existence of mulatto children in this way, as I would for an impurity in the blood of the bee, by Mr. Kirby's Theory.

Hulmeville, Pa. C. W. T.

Retention of Drones.

It has been regarded as an unaccountable circumstance that drones are retained in queenless colonies, though they are regularly expelled from those which have a fertile queen. It, however, admits of satisfactory explanation. Drones are produced and retained solely for the purpose of fecundating the young queens; and hence they make their appearance in normal colonies only at such times when either swarming may be looked for, or the death of a queen expected. So long as pasturage remains abundant, the swarming impulse prevails more or less strongly among the workers, and the presence of drones is instinctively felt to be a continuous necessity. Whether swarming will or can take place, is altogether uncertain—the issue or non-issue depending on the vicissitudes of the season. And during the continuance of this uncertainty, drones are nourished and cherished, for they may, at almost any moment, be wanted for the service of the queen of the parent stock or those of the after-swarms. But when pasturage fails or greatly diminishes, the swarming impulse vanishes also; and the drones, being then regarded as a costly incumbrance, are summarily ejected—sometimes promptly exterminated *en masse*, especially if the old queen be still hale and prolific. From the like cause also—the sudden failure, or partial failure of pasturage and consequent extinguishment of the just nascent swarming impulse—the sudden expulsion of the first hatched drones, and the entire destruction of the drone brood, sometimes takes place early in spring, even in May.

Stocks which have swarmed once in the season, and second swarms which seldom contemplate swarming the first summer, generally despatch their drones more promptly, when an unfavorable change of weather occurs, than early first swarms and stocks which have not yet swarmed.

Drones are certainly of no use to a queenless colony—tending rather to hasten its destruction; but the workers, perceiving their destitute condition, retain the drones instinctively, as of prime necessity, in case they should succeed in rearing a queen; and, ultimately, they destroy them only when they find eggs and brood in the cells—apparently regarding *that* as the evidence that they are again supplied with a fertile queen.

Sometimes, however, an evident aberration of instinct is exhibited in a colony. The workers in a queenless stock, or in one having a drone-producing queen, will occasionally expel their drones with as much zeal and system, as those of normal colonies. But these are exceptions which never occur, unless in very populous hives. The bees appear here to be self-deceived by their own multitudinous hosts; or, having an egg-laying queen, fancy themselves secure in their "hopes of succession." Colonies which have no brood, will certainly expel their drones.

Introduction of Queens.

BY DZIERZON.

One of the most important operations in practical bee culture, is the introduction of a queen in substitution for one designedly removed from a colony, or to supply the place of one that has died or was accidentally lost. Some process for these purposes generally becomes necessary in the fall, when weak stocks are to be united, and we have on hand a supply of supernumerary young fertile queens, chiefly taken from second swarms, or late made artificial colonies. If some of the stocks which are in a fit condition for wintering, contain queens two or three years old, it is highly advantageous to remove and replace them by such as are yet young and vigorous. Though a two year old queen may still be sufficiently prolific to supply an ordinary sized hive with an adequate number of eggs, a young, fertile, and undefective queen is, nevertheless, in many important respects, much more valuable. She is more vigorous and has prospectively a longer lease of life; and, if in the ensuing year, in consequence of an unpropitious season, her colony should not be able to yield either a natural or an artificial swarm, it will still become sufficiently populous to winter safely.

Of late years, moreover, the safe introduction of queens has derived additional interest and importance, from the circumstance that many beekeepers are anxious to substitute Italian queens for those of the common race, as the speediest mode of acquiring a stock of the new variety.

The customary mode of effecting the change is to remove the old queen, confine the one intended to be substituted in a suitable small cage, place her thus confined in the hive among the workers, that these may become familiar with and reconciled to her presence, and then liberate her. This process, if properly executed, and with due reference to considerations to be hereafter stated, is almost invariably successful. Yet Dr. Dönhoff has expressed the opinion that it also is a precarious operation, because bees will become estranged from their own queen, if she be thus confined, so as to assail and destroy her when again set free. This, I conceive, is going rather far; and if such an occurrence took place in Dr. D.'s practice, there must have been some special reason for it. The queen may have contracted an offensive odor from the cage in which she was confined, and was then regarded as a stranger in her own hive, and rejected. I know that in many districts, especially in well wooded countries, it is a prevalent custom to confine the queens thus when swarms are hived, and keep them imprisoned for protracted periods, to prevent the swarms from absconding; and we never hear complaints that they are killed when liberated. I have, myself, confined thousands of queens temporarily. When set free, they immediately began to *teet*, even if old and fertile, and matters forthwith proceeded as orderly as before. Only on a single occasion, was a queen killed for me by her own bees. I confined her early in the morning, intending to send her off in the afternoon. She was destroyed when set free; but I suspect she had contracted an odor strange to her workers, which she derived, probably, from another queen which had just previously been confined in the same cage. Or she may possibly have been unintentionally stung. If a confined queen is impatient and restless, and emits tones of alarm or fear, the bees will become violently excited, and project their stings in their efforts to get through the bars of the cage, for the purpose of surrounding and protecting her. She may thus accidentally be fatally wounded, in a struggle meant for her defence. But if the queen be quiet and calm, as old queens usually are, the bees will remain as perfectly content while conscious of her presence among them, as though she were at large in the hive. But as all this cannot be foreseen or foreknown, it is best not to confine a queen, unless for special reasons it be indispensable. But when introducing a stranger queen, confinement is always a prudent precaution. I would not advise placing her, unprotected, among bees recently deprived of their own queen, even when, by commotion, they give evidence of full consciousness of their deprivation. If the removed queen was still sterile, a fertile one will readily be accepted; but even in such case, the substituted queen should previously be *besmeared with honey taken from the open cells of the bereaved colony*, or the peculiar odor which attaches to her, may induce a hostile and probably a fatal attack. But a colony, deprived in the spring of a fertile queen, in whose company the workers had passed the winter, will always prove exceedingly obstinate and intractable on such occasions, and require particularly careful management. Huber and Reaumur differ in their statement respecting the deportment of bees towards a strange queen, chiefly, I suspect, because they experimented with colonies differing from each other in condition and, of course, in character—the effects of such difference being unknown to the experimenters. It is an important consideration, too, whether the bereaved colony remains in its own well stored

hive, or is transferred to an empty one. In the latter case, the bees will feel embarrassed, and be much more disposed to accept a strange queen, than in the former. When remaining among their own stores, even if there be no eggs or larvæ remaining in the combs, the bees will sometimes rally round an old royal cell, though empty, and obstinately refuse to accept an offered fertile stranger. They regard themselves as "lords of the manor" when in their own hive; but in an empty one, they soon feel that they are themselves strangers and sojourners, and the result is a corresponding change in their deportment. If, moreover, the bees have been collected from different hives or swarms, which have long been queenless, or are taken from bereaved stocks, from parent hives which have lately swarmed, or from second swarms whose queens are yet unfertile, they will readily accept any queen, though more especially a fertile one, as soon as they have become conscious of their destitution—and this, whether she be offered to them with or without previous confinement. The most suitable period for introducing an Italian queen is, consequently, the swarming season, particularly when second swarms are issuing. If the beekeeper cannot rely with certainty on the issuing of second swarms, and is unexperienced in drumming out swarms, and unskilled in removing queens, all he has to do is to cause a large proportion of the bees of a first swarm to return to their parent hive, by forming a nucleus with the queen and a few hundred workers, and placing this temporarily in a cool cellar or dark chamber. Or the parent hive may be transposed with some other populous colony. After-swarms may then be confidently expected. But it is not necessary to await their appearance. The bees may be drummed out within a few weeks after, before any young queens have emerged; and we thus obtain a body of workers, which, unaccustomed to the presence of a fertile queen, and being now suddenly transferred to an empty hive, they feel completely nonplussed and are ready to accept any queen, whether Italian or common, which may be offered to them. Should the drumming have been delayed till a queen has left her cell, she must of course be removed before the one we desire to introduce is offered. The bees may be left in the unfurnished hive till the following morning, and then transferred to one containing combs, if such be at hand. They will, meantime, have become fully reconciled and familiar with the given queen. If not sent to a distance, the hive must be set where the parent stock stood, and the latter moved to some other place. The queen will not be endangered by the bees which may leave the parent hive and unite with the driven swarm, for the parent stock is still either queenless, or has one yet unfertile, for which the bees feel no attachment. All this is much more speedily and more easily accomplished, where movable comb hives are used; for it is then an easy matter to take out some of the frames, and shake off into an empty hive as many bees as may be required for our purpose. My own practice, however, is to remove the queen, and a week or ten days later destroy all the royal cells, or take away the young queen which may have emerged. Two or three days later, I again examine every comb carefully, and destroy any royal cells that may have been started; and I then feel confident that an offered fertile queen will be accepted. Yet, I regard it as judicious to confine the queen for a time; for even if the bees should not manifest any hostility towards her, she, feeling herself a stranger in the hive, may hasten to leave it and be lost.

(For the "Bee Journal.")

ANTS.—TO KEEP AWAY FROM HIVES.

When hives are properly constructed, ants cannot get into them to propagate their young. They frequently, however, get into hives in consequence of not being properly constructed, and do much injury, as they annoy the bees, injure the hive by eating into the wood, and will eat the honey if accessible. It is very little trouble to drive and keep the ants away from the hive, although much trouble has been experienced by many, for the simple reason that they knew no remedy. *To drive the ants away from the hive*, or out of their retreat, direct upon them a small quantity of the smoke of wood or tobacco. Each one will usually shoulder a number of their young, and "secede" *instanter! To keep the ants away from the hive*, apply, as soon as they have mostly disappeared, thinly in places where they frequent, with the feather part of a quill, the *spirits of turpentine*; they will not be seen again, in general, during the remainder of that season; but should they return, repeat the application. This preventive is very simple as well as efficacious; try it.

M. M. Baldridge.

Middleport, Niagara Co., N. Y., 1861.

One square inch of *worker* comb contains about 25 cells on one side, on both, 50. Hence, a piece of comb 4 inches by 5, will contain 1000 workers.

One square inch of *drone* comb contains about 16 cells, and on both sides 32.

The cells of workers are 7-16 of an inch in depth, and drones are 9-16.

[For the "Bee Journal."]

A Successful Wintering of Bees.

As the season has come round when the careful apiarian looks well to the comfort of his little busy friends, the writer is reminded of his success last winter, and gives his experience for the benefit of those who have as yet no settled plans for the better preservation of their bees during the cold weather.

The writer's hives have movable combs. The size is 14 inches every way on the outside, and each one is placed by itself upon a small platform, close to the ground. On the top of each hive are four holes for supers. The cover which goes over the supers, is large enough (say 14½ inches in the clear) to slip over the hive, and when the supers are off, covers the hive completely, and still leaves two or more inches space between the top of the hive and the top of the outside cover. (In summer, this same cover is raised sufficiently to place supers under, and rests upon cleats, which are screwed on to the four sides of the hive at any height desired.) Last winter, the writer opened one of the holes in the top of the hive, and tacked wire-cloth over it, and then put on the cover (or surtout, I call it). The opening made in the cover, to correspond with the entrance to the hive, when slipped wholly down, is not more than 1½ inches long, and ½ inch high. Thus, no great current of air can blow into the hive, and the moist atmosphere rises through the hole in the top, instead of collecting dampness in the hive.

The writer was never so successful in wintering his bees as the last season. Upon raising the covers in the spring, instead of a damp mass of debris, and large quantities of dead bees, the floor was dry, and the caps of the cells lay along in regular order under the spaces between the combs —showing that the bees had not moved much.

The number of dead bees was much less, and evidently those which had died a natural death—not the sleek, whole winged ones, but dark, jagged-winged, *hard* workers—perhaps a half tumbler full in each hive.

Though the *size* of the hive is here given, it is not necessary that it should be adopted for the better preservation of the bees. The *principle* can be followed out by any using the square box hive, common among farmers. Another advantage in connection with this arrangement is, that if the bees fall short of honey, they can be readily fed.

One of my hives (about February) had not a drop of honey in it. I filled a tumbler full of plain barley candy, and inverted it over one of the holes, and the bees leisurely consumed it all. One pound (cost 25 cts.) carried them through till the time of fruit blossoms, when (the weather being favorable,) they laid up sufficient to last till the white clover came.

Will not some others give their experience respecting this most important matter of keeping bees through the winter?

And oblige APIS.

[For the Bee Journal.]

I have kept bees in the upper part of the city of New York for many years, where they steal from sugar houses and groceries, and my experience does not agree with that of the beekeepers on the banks of the Oder. A sugar refinery within range of an apiary would, in my humble opinion, prove very destructive, unless so arranged that bees could not get at the sugar. The number that lose their lives in obtaining food from any source except flowers, more than balances any temporary gain by those who succeed in regaining their hives.

Most insects show a commendable degree of caution in alighting upon a vessel of fluid; but the bee, eager upon plunder, pitches headlong in, and the chances of a safe exit are sadly against him. In open air feeding, the feeding troughs have to be made with special provision to guard their lives, and even then many get bedaubed and never regain their home.

The propensity of the bee to seek food from illegitimate sources, varies very much at different seasons of the year, and depends mostly upon the yield from natural supplies.

In transferring bees and comb, when bee pasturage is abundant, no trouble is experienced from robbers; but, at other times, the operation is attended with great risk to the swarm, and annoyance to the operator. When there is a lack of flowers, examinations involving an exposure of comb should not be undertaken, except either very early in the morning, or after flying has ceased in the afternoon,

I have observed that a queenless hive will decrease more rapidly in the city, within reach of sugar houses, than in the country. One can generally tell whether his bees are obtaining their supplies from refineries or from flowers.—If from flowers, they return looking clean, and the strength of the colony is maintained or on the increase; but if actively engaged in robbing, many return bedaubed and they decrease rapidly. This does not apply to robbery of other hives in which they do not get soiled, and the chief loss is in the first conflict. E. P.

Age of Bees.

Many people say bees only hive six months; now, I have two hives, to each of which I introduced a Ligurian queen, by fumigating them in July, 1860. In October, I bought a swarm that had been already fumigated to take the honey; I fumigated it to take the queen away, and then added to it one of my Ligurian queens to strengthen her. Now, this is the 16th of September, and there is not only a large number of English bees in the Ligurian swarms, but also a great number in the old stocks, the Ligurians having swarmed—one twice and the other (that from which I took the Ligurian queen to add to an English stock) three times. Now, here is a large quantity of bees alive that must be more than a year old, and not only are they that age, but many of them have been fumigated twice. As I am not clever enough with bees to take the queen away without fumigation, I generally use it, and have found, when carefully done, very little loss, and after a day or so the bees seem to have quite recovered.—*London Field.*

Before the above can be received as evidence of the life of the worker exceeding one year, the writer must prove that the "English bees" in his Ligurian colonies are not the progeny of his Ligurian queens, and also that they have not wandered in from English stocks, if he have any standing near them. It is well known that young workers sometimes enter a strange hive, and are kindly received and remain attached to their new home. Drones, especially, are not particular where they "put up." In some of my colonies that received Italian queens sixteen months ago, there are still a few bees that have no yellow rings, and are not distinguishable from the common black bee. These hives contain also more or less dark-colored and imperfectly marked workers. The mothers may be hybridized, notwithstanding a majority of their progeny are perfect in their form and marks. These colonies have as many apparently black bees now, as they had six or eight months after the Italian queens were given them, and I think the same will be the case during the life time of these queens, and that the "black bees" are their progeny.

I introduced an Italian queen to a strong colony, August 24th, 1860. I examined the colony frequently during the months of June and July, and could not find any black bees among them; all were perfectly and uniformly marked, differing a little in brightness, according to age. This colony was in an isolated position. I removed the queen in July, and allowed them to hatch a queen from her eggs. In October, I examined the colony and found some "black" bees, evidently the progeny of the young queen, but many of the young bees looked pure. I have raised, at a friend's apiary, some half and quarter-blooded Italian and black bees, for the purpose of seeing the effect upon their markings; but this is not the place to enter upon a statement of the results.

Of Fumigation, the writer says—"After a day or so, the bees seem to have quite recovered." It is unnecessary and cruel to smoke bees to such an extent—when properly done, they ought to recover in a few minutes, and be able to go on with the labors of the hive as if nothing had been done to interrupt them. The less smoke used, the better, if searching for a queen. In uniting colonies, more smoke may be used. E. P.

Bees and Flowers.

The double stock, or double flower, having its seed vessels and parts of fructification transformed into petals, either by a diseased seed, or excess of nourishment caused by rich earth, cannot perform its duty to nature by replenishing its species by seed. This beautiful though unnatural flower would, therefore, soon become extinct, were not florists careful in sowing the seeds of the single or natural flowers growing near those which have double blossoms. On examining a number of the double blossoms, we sometimes find a single anther concealed between the petals, the fecundating properties of which, although as infinitely small as the pestilential particles in the air, are sufficient to carry disease to every pod of seed, the stigma of which it shall have passed over, either by the aid of the air, or the accidental assistance of insects. Bees and other insects which live on the nectar of plants, seldom rest on flowers that have become so double as to exclude the parts of fructification, because there is no honey or nectar where there are neither anthers nor stigma. But if a single anther be growing in a double flower, the bees are sure to discover it, and thus they convey the pollen to more perfect plants; since nature, which is so perfect in all her works, has not inclined the bee to luxuriate indiscriminately from flower to flower of different generas, for then would the pollen of the melon be wasted on the stigma of a rose or a poppy; but these industrious insects may be watched from blossom to blossom of every variety or species of a plant, without touching on one of a different family. Thus, one bee will be seen collecting from the natural order Cucurbitaceæ, whilst a second is rifling that of Rosaceæ, and others that of Labiatæ, &c.: and Jussieu himself is not better acquainted with the affinities of plants, than are the bees and other insects which feed on the nectar of flowers.—PAXTON.

From Dr. Donhoff's "*Contributions to Bee Culture.*"

WHAT IS THE MAXIMUM OF POPULATION TO WHICH A COLONY MAY ATTAIN?

1. Under favorable circumstances, in the most genial season of the year, the queen-bee may certainly lay three thousand eggs a day. If we assume this as the *maximum*, and furthermore that she can continue to be thus prolific during six weeks or forty-two days, or—naming a definite period—from the 1st of June to the 12th of July inclusive, there will issue from the cells three thousand young bees, daily, in the interval from the 21st of June to the 2d of August inclusive; and the colony would thus, if for the present we disregard casualties, contain 126,000 *young* bees on the 2d of August.

2. The average duration of life of the bees existing in a colony during a conterminous period, is, in the summer, about six weeks.* I have satisfied myself, by observation of Italian bees this season, that this estimate, first made by Dzierzon, is substantially correct; for the common bees remaining in a colony, at the end of six weeks from the day an Italian queen was given to it, were relatively so few in number as not to be worth taking into account.

These assumptions I regard as reasonable, reliable, and warranted by the observations of the most competent beekeepers.

Cordially approving of the accurate mode of conducting investigation—which the Baron of Berlepsch, following the example of Huber, has the merit of re-introducing in apiology; and which does not content itself with mere *a priori* reasoning, but strives to give the precision of number and measure to the observed facts recorded—I stupefied a swarm of bees just issued, and measured it accurately in a glass vessel. Three weeks thereafter, just before any brood had left the cells, I stupefied and measured it again. The result showed that less than one-third of the original quantity remained in the colony.

Accordingly, if we assume that the average duration of life of *a generation* of bees is six weeks, the colony in which 126,000 bees were hatched within the six weeks preceding the 2d of August, will no longer contain any of the older bees, or such as were hatched prior to the 21st of June. Nor will the whole of the 126,000 young bees be still in existence, as is manifest from the following considerations:

If the conterminously produced mass of bees, or to use a briefer expression—*a generation*, dies out in six weeks, then, of the 126,000 bees which came into existence successively in that period, one-half will have perished at the close of the term; for the medium value of the life of the bees is only half as great at the end of the term, as that of an entire generation. The age of a bee hatched on the 21st of June, will, on the 2nd of August, be 42 days, while that of another, hatched on the 2d of August, is 0 day—the middle term, therefore, is 21 days.

A bee hatched on the 22d of June, will be 41 days old on the 2d of August; and a bee hatched on the 1st of August, will be one day old on the 2d of August. The aggregate of the ages is 42 days, and the medium age is the half thereof, 21 days. Now, if we conceive the several ages of the bees in the colony to be an arithmetical series, we shall readily see that the middle term of this series is also 21 days.

The medium age to which the 126,000 bees would have attained on the 2d of August, is, consequently, 21 days; while the medium term of the ever-diminishing mass of bees constituting the colony hived on the 21st of June, will, on the 2d of August, or in this period of six weeks, be 42 days—none of them then surviving.

Now, if at this busy season, all the bees of a colony severally perish in 42 days, then only one-half of the whole number hatched since the 21st of June, will be dead on the 2d of August. Only one-half of the term allotted to a generation having elapsed, the bees will have made only one-half of the whole number of life-perilling excursions, and have encountered only a moiety of the casualties to which they are necessarily exposed. Hence, of the 126,000 young bees hatched, one-half will have perished before the 2d of August, and 63,000 remain living on that day.

But if, of the 126,000 bees hatched, 63,000 perish in 42 days, the average daily mortality or loss is 1500. Now, as the existing stock of bees may be conceived of as an arithmetical series; and as the increase of life-perilling excursions, and the consequently resulting losses, likewise constitute an arithmetical series; and as the first term of this series is 0, the middle term 1500, and the last term 3000, it follows that on the 2d of August, the daily loss will have reached 3000. Hence, from the 2d of August (or did the prolificness of the queen remain undiminished), the daily loss and gain respectively would balance each other; and there would thenceforward be neither increase or diminution of the aggregate number constituting the colony. Thus, we reach the conclusion that 63,000 bees is the *maximum* number which can, in the most favorable circumstances, contemporaneously exist in a colony, *as the progeny of a single queen.* Such is, consequently, the largest extent to which the population of a single colony can at any time attain, by natural process.

*In a colony having a queen that lays 3000 eggs daily—a degree of prolificness which presupposes an abundance of pasturage, and great activity in gathering honey and pollen, and of course a correspondingly great destruction and loss of bees—the average duration of life may be considerably less.

Bee Culture.

[We copy the following from an article on bee-keeping, written for the Patent Office Report for 1860, by Mr. William Bruckish, one of the earliest, most earnest, and most energetic advocates of the Dzierzon system. For years before leaving Germany, he labored indefatigably, spending his time and money freely, to bring that system to the favorable notice of the people and the governments, particularly in Prussia. Though his motives were then ungenerously impeached, and his efforts thwarted in many quarters, he is now frequently referred to with due appreciation and respect. It was understood that he left his fatherland with the hope of retrieving his impaired fortune in this country. How far he has realized his expectations we have not learned; but fear that in these troublous times, with such *waspish* elements all around him, he may, amid his most peaceful pursuits, have suddenly been surprised by finding his head in a *hornet's nest.* The article from his pen, though marked by quaintness of style and foreign idiom, and prepared with constant reference to Texas and the South, is, on the whole, incomparably the best essay on the subject of which it treats, that has appeared in the Patent Office Reports. Some of the previous papers—especially those which were done up so *brown*, are very precious reading for a beekeeper who seeks amusement, and delights in funny theories or amazing novelties.]

OBJECTIONS TO BEE CULTURE.

Numerous prejudices exist injurious to bee-raising, some of which require particular refutation, as most frequent, and having apparently so much weight with many persons: First: It is alleged that bees yield no profit, or at least so little that they will not pay for keeping; and, as to the increase of national wealth, that their yield is hardly of any importance. Secondly: It is said that, in view of their propensity to sting, it is always a risk, and even danger, to keep bees. Thirdly: It is affirmed that it is too difficult, and requires too much time, to give the bees such a management as is most conducive and natural to them.

As to the first objection, it is true that no revenue can be expected from an irrational and unnatural treatment of bees. But wherever this industrious little creature has been properly cared for, during a tolerably fair season, in countries which are not wholly deficient in honey plants, they have always yielded their keeper a corresponding return, not only compensating him for his time, but also blessing many a bee-raiser with prosperity. The question, however, is a more serious one, whether individuals or whole families can derive their principal support from bee culture. Even this question can be answered in the affirmative. In Germany, there are no places altogether destitute of honey, but in this country, both extremes may sometimes be met with, for there are sections suffering from prevailing dryness, where neither trees nor shrubs will grow, and where the bees must of course starve. Again, there are other sections, and these form by far the greater portion of the country, abounding in honey, where the bees can collect only the smaller part of this abundance, no matter how much they store away. In dry places and poor seasons, the bees are reduced to a mere handful around the queen, and they will even cease their excursions for honey, as useless. These hard times, in our hot climate, usually occur in midsummer, while in the northern parts of the United States and in Germany, many hives are killed by cold and want of food. Many hives there, too, after consuming a large quantity of honey for several months, will starve, though a little more would have saved them, which, however, during great cold, it is difficult to give them. The conditions for bee culture in this country are, on the whole, quite different from those of Germany. Wet summers there, with cool weather, cause the ruin of bees, however beneficial they may be to the field crops. Dry summers, on the contrary, are more favorable to them, because the drought, unless very protracted, instead of diminishing their food, only tends to increase it. But in this southern country, here in Texas, where dryness is usual, the rainy seasons are a real refreshment to man, animal, tree, and every other product, and especially so to bees. While in the Northern States the spring, including June and half of July, forms the main period for gathering honey, this is done in the fall at the South. During good weather, the bees here gather from January to August only what they want for their own use; while during the three months of September, October, and November, they gather all their surplus for man. Many a hive with us, in Texas, containing but a handful of bees in August, requires only sufficient rain to become populous again within three weeks. In three weeks more, every part of the hive will be filled up, while if it should enjoy favorable weather for two or three weeks more, every space that has been emptied, will be again filled with a second crop. Generally speaking, the South is far more adapted to the bee, than the North. Though an oppressive heat

is not favorable to it, even if it rest a little during the warmer hours of the day, yet cold is much more injurious, frequently causing destruction. While it is well known that the bee can live at the equator, it is not yet ascertained how far north it may do so. In Sweden, it still prospers, and affords a surplus of honey.

The most favorable conditions for bee culture, are found in those countries which combine great warmth with sufficient humidity; where none of the millions of blossoms is deficient in its nectar formed from the abundance of juice, but which is almost wholly wanting in dry and unfruitful regions. The nectar of the blossoms, as well as the pollen, form the only food of the bees, with the exception of the honey dew, mainly the product of the aphides, and which the bees gather from the leaves of the linden, the chestnut, the oak, and other trees. That bee culture in the South pays a larger profit than at the North, is shown by the fact that each colony at the North requires at least from fifteen to twenty pounds of honey as food for winter, while at the South it hardly requires five pounds, being about fifteen pounds less, that may be counted among the profits of the beekeeper As regards the annual yield, figures will also here decide, as in other cases. A colony, including the hive, which in many cases is almost worthless, is sold here (in Texas) for from five down to three and often two dollars.

Whether the price be high or low, the profit will be at least 100 per cent. in case a new colony or swarm be obtained. But in favorable seasons, two swarms, either natural or artificial, may be expected from a hive. The intelligent practical beekeeper may annually raise ten new colonies, in this favored region, from one old stock. But the question is whether the supplies of nature will nourish and support his weak colonies. This will certainly require that they be located in a district extraordinarily rich in honey, such as the writer has never known. Dr. Blumenau, of Brazil, stated in 1852, that more than a dozen swarms had issued in a season from one single hive in that country. Such an increase might be possible in a very rich locality, and Dr. Blumenau is a reliable authority, as the moderation of his other statements shows. At a distance of only thirteen miles from the writer's residence, a beekeeper (M. Spangenberg) has hived eight natural swarms from two old stocks, while three escaped under his own eyes, and judging from certain circumstances, probably three more absconded unnoticed. These make fourteen swarms from two old colonies, a sevenfold increase; and this in a stony and sterile region, of which only a small portion is susceptible of cultivation. Five of these eight swarms stored up a considerable quantity of surplus honey during their first summer.

The yield of honey annually produced by one hive in the north of Germany will, on an average, hardly exceed ten pounds, unless the summer is unusually favorable; but in the United States, at least at the South, and this in dry localities, as in Western Texas, there are but few years when a stock, on an average, yields less than twenty pounds a year. It is true, there are also colonies which have lost their queens, or which have become weakened from some other cause, and have not saved anything for the coming year, except their lives and their health. But such are brought into the average, by the prominent hives yielding one hundred pounds of honey, and over; for, a vigorous colony in a suitable hive, and enjoying a favorable season, will here sometimes yield as much as two hundred pounds a year. Estimating the price of honey at only fifteen cents a pound, the yield of the average amount of twenty pounds, is three dollars, or seventy-five per cent. of the purchase money at four dollars per hive. From this, the cost of management and other incidental expenses must be deducted This amount, however, is inconsiderable, and diminishes in proportion as this branch of industry is extended. If bee culture is practised on a large scale, the value of the time devoted to it is divided among so large a number of hives, that it is employed to advantage. The very fact that one individual is enough to keep so many hives in order, has a great deal of weight in this question. Under the hands of a man ill-fitted for his business, not even a small number will thrive, while the intelligent practical beekeeper can take care of five hundred, and make, besides, a portion of the hives needed for new colonies. Should he require assistance during the period of swarming, it will be but little, and only for a short time. What branch of agriculture can show such another instance of one man making by his labor over one thousand dollars a year, clear gain?

The most natural and profitable way of keeping bees, is for every farmer to put up as many hives as he may want for producing his own honey and wax. With sufficient assistance, the intelligent and thorough bee-master can keep a thousand hives, and even more. Many a person may be deterred from such an increase, by the cost of the hives; but he should consider that the increase is only gradual, so that the beekeeper will be prepared for it when the expenditure becomes necessary. Even an expensive bee house may be doubly paid for from the profit of the honey

obtained the first year. Besides, a large number of hives can be more economically put up, than a small one; if the first hives, for instance, should cost two dollars, the last ones will not be more than one-fourth of this amount. A small number of colonies require good and substantial hives, while in a large apiary, a considerable proportion of them may be of less substantial construction, to serve their temporary purpose.

From two hundred to five hundred colonies may be sustained on the square mile, as the nectaries of the flowers are replenished very speedily and frequently in favorable weather. In very unfavorable weather, however, even a small number will suffer. Yet it is certain that with proper management of the bees, the country can not only produce a sufficient amount for its own consumption, but its surplus may also enter largely into the articles of export, adding much to the increase of national wealth and prosperity. Here the question very properly arises whether Nature's stores of honey, which are so rich on this continent, should be collected, as can be done with so little means, or whether thousands upon thousands of tons of honey should be lost. How many colonies might be kept, and what a vast amount of honey and wax might be produced throughout the whole country, may be seen by a glance at its extent, or noting the number of square miles, deducting the barren tracts, which are destitute of all bee food. All that the bee-raiser requires is a simple habitation for himself, room and fencing for his hives, and dogs to secure them from injury by cattle or from thieves. Bees neither require any soil adapted to cultivation nor pasture land, like cattle. Even the so-called waste land, as swamps and rocky tracts, will add to their sustenance, though nothing grows on such places but marsh plants, shrubs, or trees. They can do without agriculture and population, the latter not being desirable on account of too much intercourse and interference. The neighborhood of large cities, or a situation within a moderate distance of railroad communication, offers the beekeeper a good market for his honey, especially while yet in the comb. The vessels required in his operations are few—a boiler and some honey casks—and are not nearly as expensive as the apparatus required for the manufacture of sugar, syrup, or other products. The wax, after melting, requires no peculiar packing; it can only be destroyed by fire, and never deteriorates.

The second objection— that, on account of their tendency to sting, it is risky and often dangerous to keep bees, is without foundation. The puncture, as is well known, is the wound caused by the sting, and is accompanied by swelling. The swelling is the result of an acid similar to that distilled from the ant-hills, and contained in a vesicle at the root of the sting, from which it is poured into the wound. The bees of Germany, it is true, are often quite malicious, but those here in the South are really of a good-natured character. One may manage them for days, may produce artificial swarms, take away their honey—in short may undertake any operation with them without being stung. But suppose they were even worse than those in Germany, it would not form any really serious objection. To avoid their stings, however, the bees should neither be pressed nor squeezed; they should not be breathed on, nor should there be any jarring about their hives; and all rapid movements in front of the hives, and quick motions of the hands, must be avoided. It is said that bees are irritated by the disagreeable sweat of man; but the writer has never noticed it. This would certainly be bad, as the labor required in the management of bees cannot, at all seasons, be performed without causing perspiration; especially is this the case when hiving natural swarms during the hottest part of the day. A quiet and fearless treatment of bees is indispensable. Smoke is the most effective and seldom failing means of keeping them in due restraint. The old bee-masters always employed their earthenware smoking pot, sometimes increasing its effect by a small bellows attached to it. It was by using this implement, protecting their hands with gloves and their faces with a bee-cap, that beekeepers formerly ventured to approach their bees, performing all their operations under this oppressive shield, though they had to perspire profusely under the bee-cap, and could not see distinctly.

The Rev. Mr. Dzierzon and his followers have entirely banished the bee-cap and the glove. Instead of the smoking pot, they make use of a burning segar, or a little lighted stick of decaying linden or maple wood, the smoke of which can easily be blown by the mouth to whatever spot required; it being enough to blow a little smoke occasionally among the bees. Where no such decayed or decaying wood can be got, a bunch of rags is used. The glowing end of such a lint-stick must be dipped in water, or buried in the ground after use, so as to avoid any danger of fire. The smoke benumbs the bees; yet if enraged by a violent shock, by many being crushed, or by a hive being upset, the strongest smoke will avail little, and the beekeeper has no alternative but a speedy retreat, to allow the bees to become calm and quiet. The Italian bee does not exhibit such violence of temper; she stings only when pressed or irritated

in the highest degree. The mild character of this bee, not to mention its superior industry, renders the introduction and extension of this race important, as the fear of being stung, though often groundless, deters many from engaging in the enterprise of bee-raising. In the progress of his management, the bee-raiser will have acquired so much skill and practice that, even in an extensive apiary of 100 hives, he can readily discover and catch every bee disposed to sting. He distinguishes it by the peculiar sound it emits when buzzing about him, and strikes it to the ground with the palm of his hand. Among hundreds of humming bees he will soon recognize the tones of that one, more or less distant, which is disposed to sting. Sometimes the pain resulting from the sting is quite severe, but generally produces little inconvenience and gradually the human system becomes accustomed to the virus, and no bad results follow the infliction. On being stung, the sting should be immediately extracted, and the wound anointed with spittle, wet loam, olive oil, sal-ammoniac, alchohol, or vinegar, whichever is most conveniently at hand. The pulp of a pear may also be pressed on the wound—an experiment tried by the Rev. Mr. Fischer, of Kaaden, Bohemia, who after being stung by three bees on the point of a finger, immediately took a pear from one of his trees, laid open its flesh or pulp and pressed his finger against it. The pain almost instantly ceased, and no swelling ensued. It might be inferred from this that other fruits may prove equally serviceable. Nobody could have betrayed more fear than the writer as a new hand; but now he looks upon the sting of bees with indifference, as will every practical beekeeper; and the subject has been treated of here in such detail only because most persons attach so great importance to it.

As to the third objection, that to obtain a knowledge of the proper treatment of bees requires too much time and is too difficult, it may be remarked that these difficulties are but imaginary. Many persons are afraid of approaching a bee hive. They think that they cannot hive a swarm of bees, or take the surplus honey, &c., looking on these operations as requiring much skill, while devotedness to the object, and courage are alone sufficient for the performance of this kind of work. Let the beginner first read some good work on bees (he will soon discover the errors of many books by comparing them with better ones), observe the manipulations of practical beekeepers, as well as put up hives himself, and manage them fearlessly, and he will in a short time acquire skill to perform everything necessary, often even better than he sees it done by others.

As to the time required for gaining a knowledge of beekeeping, all operations consume the less time, the nearer they approach nature. This is true particularly with the Dzierzon method. Based on the natural history of the honey bee, it implies facility and simplicity in the treatment and habitation of bees. The hives should be as simple and cheap as possible, so as not to reduce the profits of the yield. All artificial and expensive hives should, therefore, be banished, and every beekeeper be able to make his own hives.

Among the means best adapted for the promotion and general distribution of bee culture, instruction and practice rank highest. There are already many good bee manuals published; the influence of which, however, should be increased by the establishment of a special JOURNAL for bee culture and model apiaries. From the importance of bee culture, in respect to national economy, model apiaries ought to be established by both the National and the State governments. Such model apiaries might be attached to the Agricultural Division of the Patent Office, under the management of a special bee-master. The object of such a model apiary would be to promote bee culture, not only by distributing swarms and queens, but by diffusing practical knowledge among the public at large, and generally by serving as a bee school to teach by practical demonstrations, the natural history and habits of the bee, and to show all the operations and manipulations in bee-keeping; as, for instance, the production of artificial swarms, hiving, taking honey, &c.

The object might be still farther secured in establishments of a similar character, in connection with the several State Agricultural Schools, or other similar institutions. Such establishments, based on the results and experience of modern investigations, and the principles laid down by Science herself, and by recognized masters in this branch of industry, should be conducted only by intelligent and practical men, who, by long experience and study, have become thoroughly acquainted with the progress made in bee culture, and its present condition. To any objections against such model or experimental apiaries, on the ground of expense, it may be replied that they would not only sustain themselves, but, beyond the great object to be attained—the general promotion of bee culture throughout the country—they would furnish a rich revenue from their products.

AMERICAN
Beekeepers' Association.

Semi-annual Meeting held at Cleveland, Ohio, November 21, 1861.

The Association convened in pursuance of a call of the Executive Committee, President KIRTLAND in the chair. In the absence of the Secretary, J. C. EBY was appointed Secretary *pro tem.*

There being no Committees to report, on motion of E. T. Sturtivant, a Committee was appointed to prepare business and propose subjects for discussion. The Committee consisted of Messrs. E. T. Sturtivant, C. H. Robbison, and W. A. Flanders, who reported the following questions for consideration, viz:

1. What is the best mode of wintering bees?
2. What is the best manner of feeding bees, in every form?

Opportunity being given for persons present to become regular members, Messrs. C. H. Robbison, Lewis Twining, of Indiana, R. H. Chopin of Michigan, Col. C. J. Sanders of Kentucky, Dr. V. S. Silvers, Mr. Judson, A. Beebe, David Morrison, and Alvah Udall, complied with the rules, and were received as members.

The discussion of the first question was then opened by Dr. Kirtland, and continued by Messrs. Brown, Twining, Sturtivant, Flanders, Cunningham, Smith, and Eby.

Dr. Kirtland said he had wintered bees in various positions. Two years since, he had wintered them in hives standing out doors. If stocks were rich in stores and had plenty of bees, he should let them stand out. Last winter, he put some light stocks in a very dry cellar, where they wintered well. He would prefer to have them front towards the north, or placed in the north side of a building or fence.

Mr. Brown preferred to bury his bees in the most simple manner, which he described, giving them plenty of upward ventilation.

Mr. Twining could not think of burying bees at all. It was not natural. He wished to have them placed on the north side of a building or fence, with ventilation at bottom and top; and so arranged that he could shut in the bees, except on very warm days.

Mr. Sturtivant said, in cold climates, bees were buried very profitably; and the greatest objection to doing so here, was the changeableness of our weather. He placed a number of stocks in a cellar last winter. Those that had a current of air passing through them, suffered with dysentery. He preferred to have his hives closed at the bottom, and well ventilated at the top; and, in his opinion, the great objection to burying bees, was the trouble of taking them out in the spring.

Mr. Flanders said that in the State of New York, bees were universally buried; but he thought it would be almost their destruction, if the springs were like the last.

Mr. Cunningham said he had no experience in burying bees, but would try it this winter. He had placed some in cellars. He thought hives should not be ventilated at the bottom.

Mr. Smith thought hives should have good ventilation at bottom, and little at top.

Mr. Eby thought he should bury most of his bees, and gave his experience in wintering in that manner.

Adjourned to two o'clock, P. M.

At two o'clock, P. M., the Vice President in the chair, the Convention took up the second question, viz: What is the best manner of feeding bees, in every form? The debate on this question, which was very interesting, was opened by Dr. Kirtland, and continued by Mr. Smith, Dr. Silvers, Mr. Sturtivant, Mr. Twining, Mr. Beebe, till half past four o'clock, when the subject was laid on the table, and the Convention adjourned to 9 o'clock next morning.

Nov. 22, at 9 A. M., the Vice President in the chair, the discussion of the pending question was resumed and concluded.

As a matter of privilege, Dr. Kirtland occupied the floor, and made a statement correcting some misrepresentations in regard to the object of this Association, and refuting some articles which appeared in the Prairie Farmer. After considerable discussion, the subject was, on motion of Mr. Flanders, referred to a committee—which consisted of Messrs. Flanders, Sturtivant, and Eby.

Mr. Brown offered the following resolutions, which were adopted:

1st. *Resolved*, that it be one of the standing rules of this Association, that all persons having improvements in bee hives, be invited to present them for investigation at any of the regular meetings of the Association.

2d. That the feeding of bees for any other purpose than prolonging their stores during a late season, or a bad spell of weather, is injurious and unprofitable; and that honey is the best and cheapest food, for that purpose, so far as known to this Association.

The Convention now took up as a third question,

THE HANDLING OF BEES,

and after some remarks had been made by Messrs. Robbison, Smith, Brown, and Sturtivant, adjourned till 2 o'clock, P. M.

At 2 P. M., the Vice President in the chair, the Committee on the statement submitted by Dr. Kirtland, reported as follows:

WHEREAS, the *Prairie Farmer* has imputed to the American Bee Association a disposition of selfishness on the part of its members, individually and collectively, and has attempted to stigmatize its members by ridicule, and held up this association to the public as an institution for the purpose of subserving certain individual interests only, *therefore*

Resolved, that this Association entirely repudiates any and every such charge made by the *Prairie Farmer*, or other publications, as being without foundation and *untrue*. And this Association do most cordially assure all that are willing to become members, that it is ever ready to do all in its power to advance the beekeeping interest everywhere, and invites them to join the Association.

And your Committee recommend that the proceedings of this meeting, together with its resolutions and the statement of its worthy President, be transmitted to the *American Bee Journal*, and other papers friendly to this Association, for publication.

W. A. Flanders,
E. T Sturtivant,
J. C. Eby,
Committee.

Debate was resumed by Dr. Kirtland and Mr. Twining, and when it was concluded, all persons present having hives on exhibition were invited to point out to the Convention the particular advantages of their inventions. In so doing,

Mr. Chopin presented the Bullard hive;

Mr. Flanders presented the Flanders hive;

Mr. Twining presented the Hartman & Metcalf hive.

On motion of Dr. Kirtland, it was unanimously *Resolved*, that this Association recommend the "AMERICAN BEE JOURNAL" to all beekeepers.

On motion of Mr. Brown, the Association adjourned to the fourteenth day of March, 1862, at 10 o'clock, A. M.

J. C. EBY,
Sec'y pro tem.

Dr. KIRTLAND'S STATEMENT.

Mr. PRESIDENT:—As a matter of privilege, I claim the attention of this society for a few moments. Soon after the organization of this Association and its first meeting, several articles appeared in the *Prairie Farmer*, published at Chicago, designed to ridicule us as an association, and to satirize one of the most worthy and intelligent gentlemen who took an active part in that meeting. As those attacks were of a contemptible character, they were not deemed worthy of notice. But soon after our last meeting, that Journal again assailed us in a more open but calumnious form. Referring to our proceedings, the ostensible editor inquires—"*Whose Convention was it?*" and then goes on to insinuate that our society is only a body of selfish individuals, associated together and acting for a sinister purpose. This is the substance of his attacks—perhaps his language is not exactly quoted, for I regret that the numbers of the Journal containing them, were accidentally destroyed. From correspondents in the further West, where the *Prairie Farmer* circulates extensively, I learn that it has diffused a general impression in that region, that the BEEKEEPERS' ASSOCIATION is actuated by the basest of motives.

As one of the individuals who acted in getting up this association, as one of its members, and its President from its origin up to the present time, I feel myself called upon to correct these false and erroneous attacks. To do it with facility and success, I will appeal to our proceedings. They show clearly that the sole design and object of our society is, and ever has been, to advance and benefit the pursuit of the apiarian. At our several meetings, matters relating to this pursuit have been introduced in order, and discussed, greatly not only to the instruction and benefit of those present, but to bee cultivators generally.

Our proceedings have, on all occasions, been governed by regularity and kindness, and every thing of an opposite tendency avoided. Every interest, every view, every patent, has been allowed a representation in our society. It is open to every one who chooses to join it and pay a trivial tax. Prominent points in bee culture are extensively examined and debated, with an eye solely to the attainment of knowledge. The rapid advancement made in this pursuit in this vicinity, is mainly due to this source. In the appointment of Committees, favoritism and partiality have been carefully avoided.

With equal propriety might the *Prairie Farmer* inquire—"*Whose is the* BEE JOURNAL?" That publication is established with the same object as our Society. Both are doing a great and good work.

☞ It takes about ½ lb. of comb to hold 15 lbs. of honey.

One gallon of honey weighs 12 lbs.

The least possible space for a *loaded* worker, is 5-32 of an inch.

5-32 of an inch will allow a loaded worker to pass, but will be too small for a *Queen*.

One pound of honey contains about 20 cubic inches.

AMERICAN BEE JOURNAL.

Philadelphia, December, 1861.

TO OUR FRIENDS.

With this number (which has been somewhat delayed from unavoidable causes), we conclude the first volume of the AMERICAN BEE JOURNAL, and now announce that the publication will be suspended for a year, to be then resumed if the state of the country will admit, and those interested in bee culture desire it. Until the unfortunate troubles in our national affairs culminated in actual collision, we had most gratifying evidence that the JOURNAL would receive the requisite patronage. But the general interruption of business subsequent to that event, and the rapid succession of important occurrences which properly absorbed public attention, interfered sadly with our prospects, and prevented those accessions to our subscription list which are indispensable to the successful establishment of a publication devoted to a specialty. The JOURNAL has been well received and well spoken of everywhere, and we have reason to believe that it has given general satisfaction to its readers; yet, as the times are not propitious, we have reluctantly concluded to suspend it. Among bees, the issue of natural swarms depends on the abundance of pasturage and the fitness of the season, and our *issues* must necessarily come under a similar category.

Our design was to impart a more practical character to the contents of the second volume. The elucidation of theory has hitherto occupied much of our space, as it seemed indispensable that the foundation of rational bee culture should be laid broad and deep; since, without it, practice must be, and continue to be, mere empiricism —with which no intelligent beekeeper can remain content. Having placed before the reader the views entertained on this branch of the subject by the most eminent naturalists and apiarians in Europe, a detail of the various practical processes adopted or recommended abroad as well as at home, would appropriately follow; and we trust there has been sufficient interest excited in behalf of this delightful department of rural economy, to warrant an early resumption of our labors.

☞ The first volume of the AMERICAN BEE JOURNAL is now completed, and will be sent free of postage on receipt of One Dollar.

Bees Botanizing.

Among the many singular traits which arrest and engage the attention of one who is studying the instincts of the bee, one of the most striking is the fact—noticed already in a general way by Aristotle—that, when gathering honey, each restricts itself, for the time being, to a single species of plants or flowers. So likewise, when gathering pollen, they are equally choice and chary; or rather, indiscriminate spoliation appears to be most carefully avoided when in pursuit of the latter, as if designedly to prevent the hybridization of plants. Still, in honey-gathering at least, occasional deviations from this habit have been observed and recorded—which may perhaps have been occasioned by pressing want, or the previous state of the weather. Mr. Stockmann saw each of two bees sipping nectar from the flowers of two different species of plants, on a fine day in June. Again, in July, he noticed a bee, after foraging awhile on the blossoms of wild sage, suddenly pass to those of a neighboring scabiosa. Closer observation enabled him to detect several others acting in the same manner. The bees had been long confined to their hives by rainy weather, when a sudden change enabled them to resort to the fields. Those thus irregularly gathering, may have belonged to ill-provided recent swarms; and prolonged abstinence, and great greed for honey, may have tempted them to a violation of their instinctive practice. On the following day, Mr. Stockmann again visited the place, and then found the bees scrupulously adhering each to its distinct class of flowers. Some were passing only from sage to sage; others only from scabiosa to scabiosa. —Mr. Hofman also observed bees, on one occasion, pass from white clover to corn-speedwell, thence returning to the clover. Others passed from *Polygala cruciata* to *Calendula officinalis*, and thence to *Viola tricolor*, before they returned to the *Polygala*. He neglects, however, to refer to the previous state of the weather; nor does he say whether these several kinds of plants were equally distributed there. The Polygala may have been the main crop and abundant, with only a few of the other kinds interspersed, though then yielding nectar very profusely, and thus tempting the eager gatherers to a momentary violation of what seems to be a law with them. Certainly, the ordinary practice of the bees is to restrict their visits, through the day, to that class of plants or flowers on which they, respectively, commence operations in the morning.

☞ 3660 workers will fill a quart measure.

Monthly Management.

DECEMBER.

If his stocks were carefully prepared for wintering during the mild weather in October and November, the beekeeper will not be called on to give only a general supervision from time to time, though if warm days occur, on which the bees can fly out, he may use the opportunity to inspect his hives more narrowly. Dead bees and droppings should then be removed from the bottom-board, as a precaution to prevent the entrance from becoming obstructed or closed. This should be done quietly and expeditiously, and only when the temperature is such as to allow bees to fly. Fowls must not be suffered to roost on or between the hives, nor should dogs, cats, or other domestic animals be tolerated about the apiary, especially during the winter. The less the bees are disturbed, at this season, when complete repose is so essential to them, the better. If the hives are situated on the north side of a fence or building the bees will be less likely to be affected by transient changes of the weather, and in other locations, the front of the hives should, if as practicable, be sheltered from the sun's rays. A temporary screen will serve an excellent purpose, saving numbers of bees which would otherwise be tempted to issue and find themselves unable to return. Thin hives, whether made of straw or wood, will need some protection during very cold weather, in Northern districts; and where this seems necessary, it is always judicious to attend to it early in the season, so as not to disturb the colony when clustered in a semi-torpid state.

Bees kept in Langstroth hives, will require upward ventilation, especially if the stocks are strong. The mere removal of the tin coverings of the holes in the honey-board is not always sufficient to prevent the condensation of moisture within the hive, and the honey-board should then either be elevated about an inch, or entirely removed. If replaced by a frame of suitable size covered with canvas or coarse linen, sufficient ventilation may be furnished, and if the stock needs feeding, honey thickened with brown sugar and worked to a stiff doughy consistence, may be spread on the canvas immediately above the clustered bees, when it will be taken as required. If condensed moisture still collect within the top or cover of the hive, after the removal of the honey-board, (as sometimes happens with strong colonies) additional ventilation should be given by boring one or more $\frac{3}{4}$ inch holes through the sides of the cover. The entrance of the hives must, during this period, be kept so contracted as to allow the passage of only one bee at a time.

As a fit conclusion of these remarks on Monthly Management, now extending through the entire course of the year, we subjoin the following general axioms, extracted from "*Langstroth on the Hive and Honey Bee*" and which every new beginner in bee-keeping will do well to impress on his memory.

"1st. Bees gorged with honey never volunteer an attack.

2d. Bees may always be made peaceable by inducing them to accept of liquid sweets.

3d. Bees, when frightened by smoke, or by drumming, fill themselves with honey and lose all disposition to sting, unless they are hurt.

4th. Bees dislike any *quick* movements about their hives, especially any motion which *jars* their combs.

5th. Bees dislike the offensive order of sweaty animals, and will not endure impure air from human lungs.

6th. The beekeeper will ordinarily derive all his profits from stocks strong and healthy in early spring.

7th. In districts where forage is abundant only for a short period, the largest yield of honey will be secured by a *very* moderate increase of stocks.

8th. A moderate increase of colonies in any one season, will, in the long run, prove to be the easiest, safest, and cheapest mode of managing bees.

9th. Queenless colonies, unless supplied with a queen, will inevitately dwindle away, or be destroyed by the bee-moth or robber-bees.

10th. The formation of new colonies should ordinarily be confined to the season when bees are *accumulating* honey; and if this, or any other operation must be performed when forage is scarce, the greatest precaution should be used to prevent robbing.

The essence of all profitable bee-keeping is contained in Oettl's Golden Rule: KEEP YOUR STOCKS STRONG. If you cannot succeed in doing this, the more money you invest in bees, the heavier will be your losses; while if your stocks are strong, you will show that you are a bee-master, as well as a bee-keeper, and may safely calculate on receiving generous returns from your industrious subjects."

☞The average *weight* of workers (from four counts) is 4850 to a pound, avoirdupois.

1600 drones weigh about the same.